IB=H98 GH5H9G G97IF=H=9G5B89L7 < 5B:97CAA=GG=CB

 $K 5G \le B$; HCB k 8(7(, */.3))

:CFA +*'?

&FVg`HcZ'

5BBI5@ F9DCFHDIFGI5BHHC G97H=CB+- CF +/#U\$ C: H<9 G97 IF=H=9G 9L7<5B; 9 57H C: +3-.

?dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00

Hg

HF5BG=H=CBF9DCFHDIFGI5BHHCG97H=CB+- CF+/#U\$C:H<9G97IF=H=9G9L7<5B;957HC:+3-.

?dg i]Z igVchⁱdc eZg^dY [gd b <db b ^hh^dc [^aZ cj b WZg .../+13547

wos in

B9KG7CFDCF5H=CB

#9 i RTe R ^ V ` W cVXZdecR e Rd da VTZWZVU Z Zed TYRceVc\$

8V]RhRcV #GeReV `c `eYVc [fcZdUZTeZ`_ `W % 1_T`ca`cRel`_`c`cXR_lkRel`_\$

+,++ 5gV_fV `W eYV 5 ^ VcZTRd& BVh M`c\& BVh M`c\ #5UUcVdd `W acl_TlaR] ViVTfelgV `WWZTVd\$

> FVXZdecR_erd eV]VaY`_V_f ^ SVc& Z_T]fUZ_X RcVR T`UV #,+,\$.+0'-.** GVTfclelVd cVXldeVcVU afcdfR_e e` GVTel`_ +,#S\$ `W eYV 5Te4

BR^V`WVRTYViTYR_XV`_ hYZTY cVXZdeVcVU HZe]V `\ VRTY T]Rdd HcRUZ_X Gj ^ S`]#d\$ <aVhh : <db b dc LidX`* eVg kVajZ ".,. / eZg h]VgZ GPL: M]Z GVhYVf @adWVa LZaZXi FVg`Zi <aVhh ; <d b b dc LidX`* eVg kVajZ ".,. / eZg h]VgZ GPL M]Z GVhYVf @adWVa LZaZXi FVg`Zi

GVTfcZeZVd cVXZdeVcVU afcdfR_e e` GVTeZ`_ +,#X\$`W eYV 5Te4

GdcZ #HZe]V `W T]Rdd\$

BcY^XViZ Wn X]ZX` b Vg` ^[i]Z gz\^higVci ^h V 1 Zaa+`cd 1 c hZVhdcZY ^hhjZg* Vh YZ[^cZY ^c K jaZ 2.3 d[i]Z LZX jg^i^Zh : Xi, RZh Č Gd

BcY^XViZ Wn X]ZX` b Vg` ^[i]Z gZ\^higVci ^h cdi gZf j ^gZY id [^2Z gZedgih e j gh j Vci id LZXi^dc / 1 dg LZXi^dc / 3&Y' d[i]Z : Xi, RZh Gd

BcY^XViZ Wn X]ZX` b Vg` 1]Zi]Zg i]Z gZ\^higVci &/ ']Vh [^aZY Vaa gZedgih gZfj^gZY id WZ [^aZY Wn LZXi^dc /1 dg /3kY' d[i]Z LZXjg^i^Zh >mX]Vc\Z : Xi d[/712 Yjg^c\ i]Z egZXZY^c\ /0 b dci]h &dg [dg hjX] h]dgiZg eZg^dY i]Vi i]Z gZ\^higVci 1 Vh gZfj^gZY id [^aZ hjX] gZedgih'* VcY &O']Vh WZZc hjW_ZXi id hjX] [^ac \ gZfj^gZbZcih [dg i]Z eVhi 7. YVnh, RZh 🍎 Gd

BcY^XViZ Wn X]ZX` b Vg` 1]Zi]Zg i]Z gZ\^higVci]Vh hjWb^iiZY ZaZXigdc^XVaan ZkZgn BciZgVXi^kZ =ViV ?^aZ gZfj^gZY id WZ hjWb^iiZY ejghjVci id KjaZ 2.3 d[KZ\jaVi^dc L+M &t010,2.3 d[i]^h X]VeiZg' Yjg^c \ i]Z egZXZY^c \ /O bdci]h &dg [dg hjX] h]dgiZg eZg^dY i]Vi i]Z gZ \^higVci 1Vh gZfj^gZY id hjWb^i hjX] [^aZh', RZh 🎽 Gd

BcY^XViZ Wn X]ZX` b Vg` 1]Zi]Zg i]Z gZ\^higVci ^h V aVg\Z VXXZaZgViZY [^aZg* Vc VXXZaZgViZY [^aZg* V cdc+VXXZaZgViZY [^aZg* V h b VaaZg gZedgi^c \ Xd b e Vcn* dg Vc Z b Zg \^c \ \gd l i]

EVg\Z VXXZaZgViZY [^aZg

: XXZaZgViZY [^aZg

L b VaaZg gZedgi^c \ Xd b eVcn

Gdc+VXXZaZgViZY [^aZg

 $> bZg \land c \ \ db eVcn$

B[Vc Z bZg\^c\ \gd1i] Xd beVcn* ^cY^XViZ Wn X]ZX` bVg` ^[i]Z gZ\^higVci]Vh ZaZXiZY cdi id jhZ i]Z ZmiZcYZY igVch^i^dc eZg^dY [dg Xd bean^c\ 1^i] Vcn cZ 1 dg gZk^hZY [^cVcX^Va VXXdjci^c\ hiVcYVgYh egdk^YZY ejghjVci id LZXi^dc /1&V' d[i]Z >mX]VcZ : Xi,

BcY^XViZ Wn X]ZX` b Vg` 1]Zi]Zg 1]Z gZ\^higVci]Vh [^aZY V gZedgi dc VcY ViiZhiVi^dc id ^ih b VcV\Zb Zciłh VhhZhh b Zci d[i]Z Z[[ZXi^kZcZhh d[^ih ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c \ jcYZg LZXi^dc 2.2&W' d[i]Z LVgWVcZh+HmaZn : Xi &/ 3 N,L,<, 5040&W'' Wn i]Z gZ\^hiZgZY ejWa^X VXXdjci^c \ [^gb i]Vi egZeVgZY dg ^hhjZY ^ih VjY^i gZedgi,

Gd ` BcY^XViZ Wn X]ZX` b Vg` 1]Zi]Zg i]Z gZ\^higVci ^h V h]Zaa Xd b eVcn &Vh YZ[^cZY ^c K jaZ /0W+0 d[i]Z :Xi', RZh

: h d[=ZXZbWZg 01* 0.0/* i]Z aVhi Wjh^cZhh YVn d[i]Z gZ\^higVci-h b dhi gZXZcian Xdb eaZiZY hZXdcY [^hXVa fjVgiZg* i]Z V\\gZ\ViZ b Vg 'Zi kVajZ d[i]Z gZ\^higVci-h <aVhi : <db bdc LidX`* eVg kVajZ ".,./ eZg h]VgZ *]ZaY Wn cdc+V[[^a/WiZh 1Vh Veegdm^b ViZan "6*5./*32.*624* WVhZY jedc i]Z Xadh^c\ eg^XZ d["00,11 eZg h]VgZ Vh fjdiZY dc M]Z GVhYVf LidX` F Vg`Zi dc i]Vi YViZ* VCY i]Z V\\gZ\ViZ b Vg `Zi kVajZ d[i]Z gZ\^higVci-h <aVh ; <db b dc LidX`* eVg kVajZ ".,. / eZg h]VgZ*]ZaY Wn cdc+V[[^a^ViZh 1 Vh Veegdm^ b ViZan "0*513*412*537* WVhZY jedc i]Z Xadh^c\ eg^XZ d["00,33 eZg h]VgZ Vh fjdiZY dc M]Z GVhYVf LidX` F Vg`Zi dc i]Vi YViZ,

: h d[

.0',3/*31* $#=(F(G(9^a)))$ =UV_eZWZTReZ`_ B`(\$

> +**-0 #NZa 7`UV\$

H56@9 C: 7CBH9BHG

			IV\Z
I:KMB			
	BM>F/,	•	/
	BM > F / :,	<u>K^h` ?VXidgh</u>	/4
	BM > F /;,	NcgZhdakZY LiV[[<d b="" td="" zcih<=""><td>1.</td></d>	1.
	BM>F 0,	<u>IgdeZgi^Zh</u>	1.
	BM>F 1,	<u>EZ\Va IgdXZZY^c\h</u>	1/
	BM>F 2,	$\underline{F^{cZ} LV[Zin = ^hXadhjgZh}$	1/
I : KM BB			
	BM>F 3,	$F Vg Zi [dg KZ \wedge higVci + db b dc > fj^in* KZaViZY LidX] daYZg F ViiZgh VcY BhhjZg I jgX] VhZh d[> fj^in LZXjg^i^Zh$	10
	BM>F 4,	<u>TKZhZgkZYU</u>	10
	BM>F 5,	<u>$FVcV Z b Z c i + hX j h d V c Y : cVan h d ? cVcX a < dcY i d V c Y KZ h j a i d HeZgVi d c h$</u>	11
	BM>F 5:,	JjVci^iVi^kZ VcY JjVa^iVi^kZ =^hXadhjgZh : Wdji FVg`Zi K^h`	36
	BM>F 6,	$?^{cVcX^{Va}LiViZbZcihVcYLjeeaZbZciVgn = ViV}$	4/
	BM>F 7,	$<]Vc \ Zh \ c \ VcY = \ hV \ gZZ \ b \ Zcih \ P \ i] : XXd \ j \ ciVcih \ dc : XXd \ j \ ci^c \ VcY \ ?^cVcX^Va = \ hXadh \ j \ gZ$	/04
	BM>F7:,	<dcigdah igdxzyjgzh<="" td="" vcy=""><td>/04</td></dcigdah>	/04
	BM>F7;,	Hi]Zg Bc[dg b Vi^dc	/04
	BM>F 7<,	=^hXadhjgZ KZ\VgY^c\ ?dgZ^\c Cjg^hY^Xi^dch M]Vi IgZkZci BcheZXi^dch	/04
I : KM BBB			
	BM>F /.,	=^gZXidgh* >mZXji^kZ H[[^XZgh VcY <dgedgviz @dkzgcvcxz<="" td=""><td>/05</td></dgedgviz>	/05
	BM>F //,	\geq mZX j i^kZ \leq d b eZchVi^dc	/05
	BM > F / 0,	LZX jg^in H l cZgh]^e d[<zgiv^c ;="" czgh="" f="" h="" kzavizy="" l="" lidx`]dayzg<="" td="" vcv\zbzci="" vcy="" zcz[^x^va=""><td></td></zgiv^c>	
		<u>F ViiZgh</u>	/05
	BM>F /1,	<pre><zgiv^c bcyzezcyzcxz<="" kzavi^dch]^eh="" kzavizy="" mgvchvxi^dch*="" pre="" vcy="^gZXidg"></zgiv^c></pre>	/06
	BM>F /2,	Ig^cX^eVa : XXdjciVci ?ZZh VcY LZgk^XZh	/06
I : KM BO			
	BM>F /3,	<u>>m]^W^ih VcY ?^cVcX^Va LiViZb Zci LX]ZYjaZh</u>	/07
		$\frac{1}{2} \frac{1}{2} \frac{1}$	/10
LB@G : MNK			/11

D5FH =

=H9A +(**6IG=B9GG**

CJ9FJ=9K

HYV 7`^aR_j

 $GZ 1 h < dgedgVi^dc &i]Z \{ < d b eVcn^* | \{GZ 1 h < dge^* | \{ 1Z^* | \{ jh^* | dg \{ djg | `^h V \ AWVa Y^kZgh^[^ZY b ZY^V VcY ^c[dg b Vi^dc hZgk^XZh XZh XZh XZh Zd b eVcn [dXjhZY dc XgZVi^c \ VcY Y^hig^Wji^c \ Vji]dg^iVi^kZ VcY Zc \V ^c \ XdciZci VcY di]Zg egdYjXih VcY hZgk^XZh id Xdchj b Zgh VcY Wjh^cZhhZh i]gdj \]dji i]Z 1 dgaY, M]Z < d b eVcn Xd b eg^hZh Wjh^cZhhZh Vxgdhh V gVc \Z d[b ZY^V* ^cXaj Y^c \ Y^\iva gZva ZhiViZ hZgk^XZh ^c : jhigVa^V* cZ 1 h VcY ^c[dg b Vi^dc hZgk^XZh VcY Wdd `ejWa^h]^c ^i]Vi VgZ Y^hig^WjiZY j cYZg hd b Z d[i]Z 1 dgaY ~h b dhi gZXd \c^oVWaZ VcY gZheZXiZY WgVcYh^ ^cXaj Y^c \ DQN GJUU C][NN] : X^[WJU* 2J[[XWh * = d 1 CdcZh* DQN I^][JURJW* 8N[JUM C^W* DQN C^W* DQN DRVN \& AVgeZg < daa^ch IjWa^h]Zgh* ?dmiZa* ?HQ LIHKML : jhigVa^V* gZVaZhiViZ,Xd b,Vj* KZVaidg,Xd b `* iVa`LIHKM* HIBL VcY b Vcn di]Zgh,$

M]Z <d b eVcn-h Xd b b^i bZci id egZ b^j b XdciZci bV`Zh ^ih egdeZgi^Zh V egZ b^Zg YZhi^cVi^dc [dg cZ 1 h* ^c[dg b Vi^dc* hedgih* ZciZgiV^c bZci VcY gZVa ZhiViZ, M]Z <d b eVcn Y^hig^Wj iZh ^ih XdciZci VcY di]Zg egdY jXih VcY hZgk^XZh id Xdch j bZgh VcY Xjhid bZgh VXgdhh Vc VggVn d[Y^\iVa eaVi[dg bh ^cXaj Y^c \ 1ZWh^iZh* b dW^aZ Veeh* h b Vgi MOh* hdX^Va bZY^V* Z+Wdd` YZk^XZh VcY higZV b^c \ VjY^d eaVi[dg bh* Vh 1 Zaa Vh igVY^i^dcVa eaVi[dg bh hjX] Vh eg^ci* iZaZk^h^dc VcY gVY^d, M]Z <d b eVcn-h [dXjh dc f jVa^in VcY egdY jXi ^ccdkVi^dc]Vh ZcVWaZY ^i id XVe^iVa^oZ dc i]Z h]^[i id Y^\iVa Xdch j b ei^dc id YZa^kZg ^ih XdciZci VcY di]Zg egdY jXih VcY hZgk^XZh ^c V b dgZ Zc \V\^c * i^ bZan VcY eZghdcVa^oZY b VccZg VcY XgZViZ deedgi jc^i^Zh [dg bdgZ Z[[ZXi^kZ bdcZi^oVi^dc* ^cXaj Y^c \ cZ 1 a^XZch^c \ VcY eVgicZgh]^e VggVc \Z bZcih VcY Y^\^iVa d[[Zg^c \h i]Vi aZkZgV \Z i]Z <d b eVcn-h Zm^hi^c \ XdciZci g^]ih, M]Z <d b eVcn ^h e jgh j^c \ b jai^eaZ higViZ/^Zh id [jgi]Zg Zmead^i i]ZhZ deedgi jc^i^2h* ^cXaj Y^c \ aZkZgV \^c \ \adWVa Vj Y^ZcXZ hXVaZ VcY kVaj VWaZ YViV VcY h]Vg^c \ iZX] cda\/Zh VcY egVXi^XZh VXgdhh \Zd \gVe]^Zh VcY Wj h^cZhhZh,

$$\begin{split} M]Z &< db eVcn^{h} Y^{k}Zgh^{[^{Z}Y} gZkZc jZ WVhZ^{C}Xa jYZh gZX jgg^{c} hjWhXg^{ei}dch^{*} X^{g}X jaVi^{d}c hVaZh^{*} VYkZgi^{h}c^{h}c^{h}WaZh d[gZVa ZhiViZ a^{hi^{c}} egdY jXih^{a}A^{X}Zch^{c} [ZZh VcY di]Zg Xdch jbZg egdY jXi hVaZh, AZVY fjVgiZgZY^{c}GZ1 Rdg^{*}i]Z < db eVcn deZgViZh eg^{b}Vg^{a}n^{c} i]Z Nc^{i}ZY LiViZh^{*} : jhigVa^{V} VcY i]Z N,D,^{*}1^{i}]^{h} XdciZci VcY di]Zg egdY jXih VcY hZgk^{XZh} Y^{hig}W jiZY VcY Xdch jbZY 1 dgaY 1^{Y}Z, \\ M]Z < db eVcn^{h} deZgVi^{h}ch VgZ dg^{Vc^{o}CY}^{c} cid h^{m} gZedgi^{c} hZ^{b}Zcih8 &^{*} =^{^{i}AiVa} KZVa > hiViZ LZgk^{XZh9} &^{*'}LjWhXg^{ei}^{d}c O^{Y}Zd \\ LZgk^{XZh9} &^{*'} = d1 CdcZh9 &^{k'} ; dd^{I} jWa^{h}^{c} 9 &^{k'} GZ 1h FZY^{V9} VcY &^{k'}Hi]Zg^{*} 1]^{X}]^{c}Za jYZh i]Z < db eVcn^{h} \ZcZgVa \\ XdgedgViZ dkZg]ZVY ZmeZchZh^{*} Xdhih gZaViZY id i]Z N,D, GZ 1h eVeZg FViiZgh &^{Vh}YZ[^{c}ZY^{c} GdiZ /4 z < db b^{i}bZcih VcY \\ < dci^{c} ZcX^{Z}h^{c} i]Z VXXd b eVcn^{c} < dchda^{Y}ViZY ?^{c}VcX^{A}a LiViZbZcih' VcY ZmeZchZh VhhdX^{ViZY} 1^{i} i]Z < db eVcn^{-h} Xdhi gZY jXi^{i}dc ^{c}^{i}Vi^{h}KZh, \end{split}$$

$$\begin{split} M]Z &< d b e V cn b V^{ciV^{ch} V 30+31 1 ZZ^{hXVa nZVg ZcY^{c}} dc i]Z Lj cYVn cZVgZhi id Cj cZ 1. ^{c} ZVX] nZVg, ?^{hXVa 0.00^{hXVa 0.0}} VcY [^{hXVa 0.0. ^{c}Xaj YZY 31^{*} 30 VcY 30 1 ZZ^{h*} gZheZXi^{Zan, NcaZhh di}Zg 1 ^{hZ} cdiZY^{*} Vaa gZ[ZgZcXZh id i]Z [^{hXVa eZg^{d}Yh ZcYZY Cj cZ 1. ^{*} 0.00^{*} Cj cZ$$

7 $ca cReV = W c^ReZ$

GZ 1 h <dgedgVi^dc ^h V =ZaV 1 VgZ XdgedgVi^dc dg^\cvan dg\Vc^oZY dc =ZXZ b WZg //* 0. /0 ^c XdccZXi^dc 1^i] ^ih hZeVgVi^dc [gd b M1Zcin+?^ghi <Zcijgn ?dm* BcX,* 1]^X] 1 Vh Xd b eaZiZY dc Cj cZ 06* 0. /1, NcaZhh di]Zg 1^hZ ^cY^XViZY* gZ[ZgZcXZh ^c i]^h : ccjVa KZedgi dc ?dg b /.+D [dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.00 &i]Z { : ccjVa KZedgi | id i]Z {<d b eVcn*} {GZ 1 h <dge*| {1Z*| {jh*}| dg {djg} bZvch GZ 1 h <dgedgVi^dc VcY ^ih hjWhYvg^Zh, M]Z <dbeVcn*h eg^cX^eVa ZmZXji^kZ d[[^XZh VgZ adXViZY Vi /0// : kZcjZ d[i]Z : bZg^XVh* GZ 1 Rdg`* GZ 1 Rdg` / ..14* VcY ^ih iZaZe]dcZ cj bWZg ^h &0/0' 2/4+12.., M]Z <dbeVcn-h <aVhh : VcY <aVhh ; <db b dc LidX` VgZ a'hiZY dc M]Z GVhYVf @adWVa LZaZXi F Vg'Zi jcYZg i]Z igVY^c \ hn bWdah {G P L : | VcY {G P L*| gZheZXi^kZan* VcY <a>h. Zuzjg^i^Zh >mX]Vc \Z &{ : LQ | ' jcYZg i]Z igVY^c \ hn bWdah {G P LEO | VcY {G P L*| gZheZXi^kZan, F dgZ ^c[dg bVi^dc gZ \VgY^c \ i]Z <db eVcn ^h exAph : VcY <aVhh ; <d b b dc LidX` VgZ a'hiZY dc i]Z : jhigVa^Vc LZXjg^i^Zh >mX]Vc \Z &{ : LQ | ' jcYZg i]Z igVY^c \ hn bWdah {G P LEO | VcY {G P L*| gZheZXi^kZan, F dgZ ^c[dg bVi^dc gZ \VgY^c \ i]Z <db eVcn ^h VkV^aVWaZ dc ^ih 1ZWh^iZ Vi``` 'WN` \LX{Y'LXV* ^cXaj Y^c \ i]Z <db eVcn ^h : ccj Va KZedgih dc ?dg b /.+D* J jVgiZgan XZedgih 2 /3kY' d[i]Z LZXjg^i^AD >mX]Vc \Z : Xi d[/712* Vh VbZcYDZY &i]Z {>mX]Vc \Z : Xi |* 1]^X] VgZ VkV^aVWaZ {[gZZ d[X]Vg \Z* Vh hdc Vh gZVhdcVWan egVXi^XVWaZ V[iZg i]Z bViZg^Va ^LaZXigdc^XVaan [^aZY 1^i] dg [jgc^h]ZY id i]Z LZXjg^i^AD vcY >mX]Vc \Z : Xi d[/712* Vh VbZcYZY &i]Z ^mX]Vc \Z : Xi |* 1]^X] VgZ VkV^aVWaZ {[gZZ d[X]Vg \Z* Vh hdc Vh gZVhdcVWan egVXi^XVWaZ V[iZg i]Z bViZg^Va ^LaZXigdc^XVaan [^aZY 1^i] dg [jgc^h]ZY id i]Z LZXjg^i^AD VcY >mX]Vc \Z : Xi d[/712* Vh VbZcYZY &i]Z {>mX]Vc \Z : Xi |* 1]^X] VgZ VkV^aVWaZ {[gZZ d[X]Vg \Z* Vh hdc Vh gZ/VhdcVWan egVXi^XVWaZ V[iZg i]Z bViZg^Va ^LaZXigdc^XVaan [^aZY 1^i] dg [jgc^h]ZY id i]Z LZXjg^i^AD VcY >mX]Vc \Z : Xi d

GaVTZR] B`eV FVXRcUZ_X :`chRcU'@``\Z_X GeReV^V_ed

 $M]^{h} YdXj bZci VcY Vcn YdXj bZcih^{cXdgedgViZY Wn gZ[ZgZcXZ^{cid i}]^{h} : ccjVa KZedgi*^{cXajY^{c}} {BiZb 5, FVcV\ZbZci-h} = ^{hXjhh^{dc} VcY : cVanh^{h} d[?^{cVcX^{Va} < dcY^{i}^{dc} VcY KZhjaih d[HeZgVi^{dch*} | XdciV^{c} hiViZbZcih i]Vi Xdchi^{i}jiZ {[dg1VgY+add^{c} hiViZbZcih] 1^{i}]^{c} i]Z bZVc^{c} d[LZXi^{dc} 0/> d[i]Z > mX]Vc \Z : Xi VcY LZXi^{dc} 05 : d[i]Z LZXjg^{i}^{A}Zh : Xi d[/711* Vh VbZcYZY, : aa hiViZbZcih i]Vi VgZ cdi hiViZbZcih d[]^{hidg^{XVa} [VXi VgZ [dg1VgY+add^{c} hiViZbZcih, M]Z 1 dgYh {ZmeZXi*} { 1^{aa*} { Zhi^{b} ViZ*} }$

{Vci^X^eViZ*| {egZY^Xi*| {WZa^ZkZ*| {h]djaY| VcY h^b^aVg ZmegZhh^dch VcY kVg^Vi^dch i]ZgZd[VgZ ^ciZcYZY id ^YZci^[n [dg l VgY+add`^c \ hiViZ b Zcih, M]ZhZ hiViZ b Zcih VeeZVg ^c V cj b WZg d[eaVXZh ^c i]^h YdXj b Zci VcY ^cXaj YZ hiViZ b Zcih gZ \VgY^c \ i]Z ^ciZci* WZa^Z[dg XjggZci ZmeZXiVi^dch d[i]Z <d b eVcn* ^ih Y^gZXidgh dg ^ih d[[^XZgh 1^i] gZheZXi id* V b dc \ di]Zg i]^c * igZcYh V[[ZXi^c \ i]Z <d b eVcn~h [^cVcX^Va XdcY^i^dc dg gZhjaih d[deZgVi^dch* i]Z <d b eVcn~h higViZ \n VcY higViZ \^X ^c^i^Vi^kZh VcY i]Z djiXd b Z d[Xdci^c \ZcX^Zh hjX] Vh a^i \Vi^dc VcY ^ckZhi \Vi^dch, KZVYZgh VgZ XVji^dcZY i]Vi Vcn [dg l VgY+add`^c \ hiViZ b Zcih VgZ cdi \jVgVciZZh d[[jijgZ eZg[dg b VcXZ VcY ^ckdakZ g^h `h VcY j cXZgiV^ci^Zh, F dgZ ^c[dg b Vi^dc gZ \VgY^c \ i]ZhZ g^h `h VcY j cXZgiV^ci^Zh VcY di]Zg ^b b edgiVci [VXidgh i]Vi XdjaY XVjhZ VXij Va gZhjaih id Y^[[Zg b ViZg^Vaan [gd b i]dhZ ^c i]Z [dg l VgY+add`^c \ hiViZ b Zcih ^h hZi [dgi] j cYZg i]Z]ZVY^c \ {BiZ b / : , K^h ` ?VXidgh | ^c i]^h : ccj Va KZedgi, M]Z <d b eVcn YdZh cdi dgY^cVg^an b V`Z egd_ZXi^dch d[^ih [jijgZ deZgVi^c \ gZhjaih VcY j cYZgiV`Zh cd dWa^\Vi^dc &VcY ZmegZhhan Y^hXaV^ bh Vcn dWa^\Vi^dc' id ej Wa^Xan j eYViZ dg gZk^hZ Vcn [dg l VgY+ add`^c \ hiViZ b Zcih * 1]Zi]Zg Vh V gZhjai d[cZ 1 ^c[dg b Vi^dc* [jijgZ zkZcih dg di]Zg 1^hZ* ZmXZei Vh gZfj^gZY Wn aV 1, KZVYZgh h]djaY XVgZ[jaan gZk^Z1 i]^h YdXj b Zci VcY i]Z di]Zg YdXj b Zcih [^aZY Wn i]Z <d b eVcn 1^i] i]Z L><, M]^h hZXi^dc h]djaY WZ gZVY id\Zi]Zg 1^i] i]Z <dchda^YViZY ?^cVcX^Va LiViZ b Zcih d[GZ 1h <dgedgVi^dc &i]Z {?^cVcX^Va LiViZ b Zcih | VcY gZaViZY cdiZh hZi [dgi] ZahZ 1]ZgZ ^c i]^h : ccjVa KZedgi,

6 I G=B9GG C J 9 F J=9 K

 $\label{eq:main_states} M]Z <\!\! d \, b \, e \, V c n \! \ \ h \, h^m \, g Z e d g i^c \, \ \ h Z \, \ b \, Z c i h \, V g Z \, Y Z h X g^W Z Y \, W Z a d \, l \, ,$

		:`c eYV \\ZdTR] j\Rc V_UVU >f_V -*\ ,*,,		
	FVgV_1	GVX FVgV_fVd 96=		
		#Z_ ^ Z]]Z`_d\$		
=^\^iVa KZVa >hiViZ LZgk^XZh	" /	*52/ "	352	
LjWhXg^ei^dc O^YZd LZgk^XZh	0	*.04	14.	
=dl CdcZh	0	*2	211	
; dd $IjWa^h]^c$	0	*/7/	1.4	
GZ1h FZY ^A V	0	*201	0/5	
Hi]Zg		Z	&OO/'	

8ZXZeR] FVR] 9deReV GVcgZTVd

 $M]Z < d b e V cn \sim h = ^ i Va KZVa > hi Vi Z LZgk^XZh hZ b Zci Xdch^hih d[^ih 4/,2 # ^ci ZgZhi ^c K> : @gdje* V ej Wa^Xan+ig VYZY Xd b e V cn a^hi ZY dc : LQ & : LQ & : LQ & : '* VcY ^ih 6. # ^ci ZgZhi ^c F dkZ, M]Z gZ b V^c^c 0. # ^ci ZgZhi ^c F dkZ ^h]ZaY Wn K> : @gdje,$

:.* 0QNT0

@[XYN[]b JWM @[XYN[]b&BNUJ]NM 1M_N[]R\RWP JWM CN[_RLN\

K>: @gdje VYkZgi^hZh egdeZgin VcY egdeZgin+gZaViZY hZgk^XZh dc ^ih 1 ZWh^iZh VcY b dW^aZ Veeh VXgdhh : jhigVa^V, K>: @gdje~h : jhigVa^Vc deZgVi^dch ^cXajYZ aZVY^c \ gZh^YZci^Va* Xdb b ZgX^Va VcY h]VgZ egdeZgin 1 ZWh^iZh gZVaZhiViZ,Xdb,Vj* gZVaXdb b ZgX^Va,Xdb,Vj VcY ?aVibViZh,Xdb,Vj* Vh 1 Zaa Vh egdeZgin gZhZVgX] h^iZ IgdeZgin,Xdb,Vj, : YY^i^dcVaan* K>: @gdje deZgViZh b ZY^V Y^heaVn VcY YViV hZgk^XZh Wjh^cZhhZh* hZgk^c \ i]Z Y^heaVn b ZY^V b Vg`Zi VcY b Vg`Zi NY_VXZci id egdeZgin* gZheZXi^kZan, ?dg i]Z nZVg ZcYZY CjcZ 1.* 0.00* VkZgV\Z bdci]an k^h^ih id gZVaZhiViZ,Xdb,Vj 1 ZgZ bdgZ i]Vc /02,/ b^aa^dc, EV jcX]Zh d[i]Z gZVaZhiViZ,Xdb,Vj Vee ^cXgZVhZY 5 # id 37 b^aa^dc VkZgV\Z bdci]an aV jcX]Zh ^c [^hXVa 0.00 Vh Xd b eVgZY id i]Z eg^dg nZVg* 1^i] Xdchj b Zgh heZcY^c \ Vab dhi [djg i^bZh adc \Zg dc i]Z Vee i]Vc Vcn di]Zg egdeZgin Vee ^c : jhigVa^V VXXdgY^c \ id G^ZahZc =^\^iVa F ZY^V KVi^c \h, KZVaXdb b ZgX^Va,Xdb,Vj gZ b V^ch : jhigVa^V-h aZVY^c \ Xdb b ZgX^Va egdeZgin h^iZ VXgdhh 1 ZWh^iZ VcY Vee, Bc [^hXVa 0.00* i]Z gZVaXdb b ZgX^Va,Xdb,Vj Vee 1 Vh aV jcX]ZY 0.,0 i^bZh bdgZ i]Vc i]Z cZVgZhi Xdb eZi^idg* VcY Xdchj b Zgh heZci /7,2 i^bZh adc \Zg dc i]Z gZVaXdb b ZgX^Va,Xdb,Vj Vee WVhZY dc G^zahZc =^\^iVa F ZY^V KVi^c \h YViV, ?aVib ViZh,Xdb,Vj ^h i]Z aVg \Zhi h^iZ [dg h]VgZ VXXdb b dYVi^dc ^c : jhigVa^V* 1^i] VkZgV\Z b dci]an k^h^ih d[1,0 b^aa^dc VcY b dgZ i]Vc 14.*... cZ 1 bZb WZgh Yjg^c \ [^hXVa 0.00,

KZVaZhiViZ,Xdb,Vj VcY gZVaXdbbZg^AXVa,Xdb,Vj YZg^AkZ i]Z bV_dg^Ain d[i]Z^Ag gZkZcjZ [gdb i]Z^Ag XdgZ egdeZgin VYkZgi^Ah^C \ a^Ahi^Ac \ egdYjXih VcY bdci]an VYkZgi^Ah^C \ hjWhXg^Aei^Adch [gdb gZVa ZhiViZ V\Zcih VcY egdeZgin YZkZadeZgh, KZVaZhiViZ,Xdb,Vj VcY gZVaXdbbZgX^AVa,Xdb,Vj d[[Zg V egdYjXi]^AZgVgX]n 1]^AX] ZcVWaZh gZVa ZhiViZ V\Zcih VcY egdeZgin YZkZadeZgh id je\gVYZ a^Ahi^Ac \

 $VYkZgi^hZ b Zcih id ^cXgZVhZ i]Z^g egd b^cZcXZ dc i]Z h^iZ^* Vh 1 Zaa Vh V kVg^Zin d[iVg \ZiZY egdYjXih*^cXajY^c \ bZY^V Y^heaVn VYkZgi^hA^c \ egdYjXih, ?aVi b ViZh,Xd b,Vj YZg^kZh i]Z b V_dg^in d[^ih gZkZcjZ [gd b VYkZgi^hA^c \ a^hi^c \ egdYjXih VcY bZ b WZgh]^e [ZZh, M]Z b ZY^V Wjh^cZhh d[[Zgh j c^f jZ VYkZgi^hA^c \ deedgijc^iAZh dc K>: @gdje~h 1 ZWh^iZh id egdeZgin YZkZadeZgh VcY di]Zg gZaZkVci b Vg Zih*^cXajY^c \ ji^a^iAZh VcY iZaZXd b b jc^XVi^dch*^chjgVcXZ* [^cVcXZ* Vjid b di^kZ VcY gZiV^a, K>: @gdje Vahd egdk^YZh gZh^YZci^Va egdeZgin YViV hZgk^XZh id i]Z [^cVcX^a hZXidg i]gdj \] ^ih IgdeigVX` YViV hZgk^XZh Wjh^cZhh* eg^ b Vg^an dc V b dci]an hjWhXg^ei^dc WVh^h,$

K>: @gdje~h ^ciZgcVi^dcVa deZgVi^dch Xdch^hi d[Y^\iVa egdeZgin VhhZih ^c : h^V* ^cXajY^c \ V 1]daan+d1cZY egdeZgin edgiVa ^c <]^cV* V 51,1 # ^ciZgZhi ^c >aVgV MZX]cdad ^Zh IiZ, EiY, &1]^X] 1 Vh gZWgVcYZY id K> : BcY^V'* V aZVY^c \ Y^\iVa gZVa ZhiViZ hZgk^XZh egdk^YZg ^c BcY^V i]Vi d1 ch VcY deZgViZh IgdeM^Zg,Xdb VcY Adjh^c \,Xdb &GZ1h <dge]daYh V 04,4 # ^ciZgZhi ^c K> : BcY^V'* VcY V /5,3 # ^ciZgZhi ^c IgdeZgin@jgj IiZ, EiY,* V aZVY^c \ Y^\^iVa egdeZgin iZX]cdad \n Xd b eVcn deZgVi^c \ b Vg`ZieaVXZh ^c Ldji]ZVhi : h^V VcY a^hiZY dc i]Z GZ1 Rdg` LidX` >mX]Vc \Z, K> : @gdje~h di]Zg VhhZih ^cXajYZ V 0. # ^ciZgZhi ^c F dkZ* Vh gZ[ZgZcXZY VWdkZ, K> : @gdje~h ^ciZgcVi^dcVa Wjh^cZhhZh YZg^kZ i]Z b V_dg^in d[i]Z^g gZkZcjZ [gd b i]Z^g egdeZgin VYkZgi^h^c \ a^hi^c \ egdYjXih VcY b dci]an VYkZgi^h^c \ hjWhXg^ei^dch [gd b gZVa ZhiViZ V\Zcih VcY egdeZgin YZkZadeZgh,

6RWJWLRJU CN[_RLN\

 $K>: @gdje^h [^cVcX^Va hZgk^XZh Wjh^cZhh ZcXd b eVhhZh Vc ZcY+id+ZcY Y^{iv} egdeZgin hZVgX] VcY [^cVcX^c \ ZmeZg^ZcXZ VcY b dgi \V Z Wgd^c \ hZgk^XZh eg^b Vg^an jcYZg ^ih F dgi \V Z] d^XZ WgVcY, K>: @gdje] Vh Xdci^cjZY id ZmZXjiZ dc ^ih [^cVcX^Va hZgk^XZh higViZ \ n Wn \gd l^c \ ^ih cVi^dc l^YZ Wgd^Zg cZi l dg` VcY YZkZade^c \ ^ccdkVi^kZ egdYjXih VcY eVgicZgh]^eh* ^cXaj Y^c \ V Y^{iv}a adVc Veea^XVi^dc l^i] NWVc` &V Y^kc^hdc d[GVi^dcVa : jhigVa^V ; Vc` E^b^iZY', M]Z [^cVcX^Va hZgk^XZh Wjh^cZhh \ZcZgViZh gZkZcjZ eg^b Vg^an i]gdj] [ZZh VcY Xd b b^hh^dch [gd b aZcYZgh* b dgi \V Z Wgd^Zgh VcY di]Zg Xjhid bZgh,$

6 NUE

F dkZ ^h V aZVY^c \ egdk^YZg d[Y^\^iVa gZVa ZhiViZ hZgk^XZh ^c i]Z N,L, F dkZ eg^ b Vg^an deZgViZh KZVaidg,Xd b `* V egZ b Zg gZVa ZhiViZ ^c[dg b Vi^dc* VYkZgi^h^c \ VcY hZgk^XZh eaVi[dg b* j cYZg V eZgeZijVa V\gZZ b Zci VcY igVYZ b Vg` a^XZchZ 1^i] i]Z GVi^dcVa : hhdX^Vi^dc d[KZVaidgh & {G : K | ', M]gdj } KZVaidg,Xd b `* Xdchj b Zgh]VkZ VXXZhh id dkZg /23 b^aa^dc egdeZgi^Zh VXgdhh i]Z N,L,* ^cXajY^c \ Vc ZmiZch^kZ XdaaZXi^dc d[]d b Zh* egdeZgi^Zh VcY VeVgi b Zcih a^hiZY VcY Y^heaVnZY [dg hVaZ dg [dg gZci VcY V aVg\Z YViVWVhZ d[{d[[+ b Vg`Zi | egdeZgi^Zh, KZVaidg,Xd b ` VcY ^ih gZaViZY b dW^aZ Veeh Y^heaVn cZVgan / . . # d[Vaa F jai^eaZ E^hi^c \ LZgk^XZh &{ F EL | '+a^hiZY* [dg+hVaZ VcY gZciVa egdeZgi^Zh ^ ci]Z N,L,* 1]^X] VgZ eg^b Vg^an hdjgXZY Y^gZXian [gd b gZaVi^dch]^eh 1^i] F ELh VXgdhh i]Z Xdj cign, KZVaidg,Xd b ` Vahd hdjgXZh cZ1 XdchigjXi^dc VcY gZciVa a^hi^c \ XdciZci [gd b V kVg^Zin d[hdjgXZh *^cXajY^c \ Y^gZXian [gd b]d bZWj^aYZgh VcY aVcYadgYh* Vh 1Zaa Vh [gd b a^hi^c \ V\\gZ\Vidgh, : eegdm^b ViZan 74 # d[^ih [dg+hVaZ a^hi^c \ h Vg] z eYViZY Vi aZVhi ZkZgn / . b^cjiZh* dc VkZgV\Z* 1^i] i]Z gZ b V^c^c \ a^hi^c \ j eYViZY YV^an, KZVaidg,Xd b ` -h XdciZci ViigVXih V aVg \ Z VcY]^]an Zc \V\ZY Xdchj b Zg VjY^c C \ 2.giV^c C \ 2.giV^c F Zig^Xh,]

^cXajY^c\ <dccZXi^dch^{LF} Iajh* FVg`Zi OBI^{LF*} : YkVciV\Z^{LF} Igd VcY LVaZh ; j^aYZg^{LF*} Vh 1Zaa Vh ^ih gZVa ZhiViZ gZ[ZggVa+WVhZY hZgk^XZ KZVYn<dccZXi<dcX⁷Zg\Z^{LF}, E^hi^ac\ VYkZgi^hZbZci VcY aZVY \ZcZgVi^dc egdYjXih Vaad 1 gZVa ZhiViZ V\Zcih^{*} Wgd`Zgh VcY]dbZWj^aYZgh id Zc]VcXZ* eg^dg^i^oZ VcY XdccZXi 1^i] Xdchj bZgh dc [dg+hVaZ egdeZgin a^hi^c \h 1^i]^c i]Z KZVaidg,Xd b 1 ZWh^iZ VcY b dW^aZ Veeh, E^hi^aC \ VYkZgi^hZ b Zci VcY aZVY \ZcZgVi^dc egdY jXih VgZ ine^AXVaan hdaY dc V h jWhXg^aei^dc WVh^hh, M]Z gZVa ZhiViZ gZ[ZggVa⁺ WVhZY Wjh^cZhh bdYZa* Vh 1Zaa Vh i]Z FVg`Zi OB1^{LF} aZVY \ZcZgVi^dc egdYjXi* aZkZgV\Z FdkZ-h egdeg^ZiVgn iZX]cdad\n VcY eaVi[dg b id XdccZXi gZVa ZhiViZ egd[Zhh^dcVah VcY di]Zg hZgk^XZ egdk^YZgh* hjX] Vh aZcYZgh VcY ^chjgVcXZ Xd b eVc^Zh* id egZ+kZiiZY Xdchj bZgh 1]d]VkZ hjWb^iiZY ^cfj^g^Zh k^V i]Z KZVaidg,Xdb ^v 1ZWh'iZ VcY bdW^aZ Veeh* Vh 1Zaa Vh di]Zg dca^cZ hdjgXZh, M]Z gZVa ZhiViZ gZ[ZggVa+WVhZy hZgk^XZh i]Vi XdccZXi gZVa ZhiViZ V\Zcih VcY Wgd`Zgh 1^i] i]ZhZ Xdchj bZgh ine^XVaan \ZcZgViZ [ZZh jedc Xd b eaZi^dc d[i]Z VhhdX^ViZY gZVa ZhiViZ igVchVXi^dc* 1]^aZ i]Z gZ[ZggVa+WVhZY hZgk^XZh i]Vi \^kZ di]Zg hZgk^XZ egdk^YZgh* cXajY^c \ aZcYZgh VcY ^chjgVcXZ XdbeVc^Zh* VXXZhh id i]Z hVbZ]^\]an fjVa^[^ZY]dbZh]deeZgh VgZ \ZcZgVaan egdk^YZY dc V hjWhXg^ei^dc WVh^h, KZVaidg,Xdb Vahd YZg^kZh gZkZcjZ [gdb hVaZh d[cdc+a^hi^c \ VYkZgi^hZbZci* dg FZY^V* egdYjXih id gZVa ZhiViZ* [^cVcXZ* ^chjgVcXZ*]dbZ^begdkZbZciVcY di]Zg egd[Zhh^dcVah i]ViZcVWaZi]dhZ egd[Zhh^dcVah id XdccZXi 1^i] KZVaidg,Xdb`~h]^\]an Zc\V\ZY VcY kVajVWaZ Xdch j b Zg V j Y^ZcXZ, F ZY^V egdY j Xih ^cXa j YZ hedchdgh] ^eh* Y^heaVn VYkZgi^hZ b Zcih* iZmi a^c`h* Y^gZXidg^Zh VcY di]Zg VYkZgi^h^c \ VcY aZVY \ZcZgVi^dc hZgk^XZh, Gdc+a^hi^c \ VYkZgi^hZbZci eg^X^c \ bdYZah ^cXaj YZ Xdhi eZg i]djhVcY* Xdhi eZg Xa^X * Xdhi eZg jc^f jZ jhZg VcY hjWhXg^ei^dc+WVhZY hedchdgh]^eh d[heZX^[^X XdciZci VgZVh dg iVg\ZiZY \Zd\gVe]^Zh,

 $1 dgaY + XaVhh hjeedgi, : kV^a Z beadnh V kVg^Z in d[eg^X^c \ b dYZah^* ^cXajY^c \ hjWhXg^ei^dc [ZZh^* Vh 1 Zaa Vh [^mZY+ dg kVg^VWaZ+eg^X^c \ b dYZah,$

M]Z <d b eVcn~h Y^\iVa gZVa ZhiViZ hZgk^XZh Wjh^cZhhZh deZgViZ ^c]^\]an Xd b eZi^i^kZ b Vg`Zih i]Vi VgZ Zkdak^c\ gVe^Yan ^c gZhedchZ id cZ1 iZX]cdad\Zh*Wjh^cZhh b dYZah* egdYjXi VcY hZgk^XZ d[[Zg^c\h VcY X]Vc\^c\ Xdchj b Zg VcY Xjhid b Zg egZ[ZgZcXZh, M]Z hjXXZhh d[i]ZhZ Wjh^cZhhZh YZeZcYh dc i]Z^g VW^a^in id egdk^YZ egdYjXih VcY hZgk^XZh i]Vi VgZ jhZ[ja [dg Xdchj b Zgh* gZVa ZhiViZ* b dgi\V\Z VcY di]Zg gZaViZY hZgk^XZh egd[Zhh^dcVah*]d b ZWj^aYZgh VcY aVcYadgYh VcY ViigVXi^kZ id i]Z^g VYkZgi^hZgh* i]Z WgZVYi]* YZei] VcY VXXjgVXn d[^c[dg b Vi^dc i]Zn egdk^YZ VcY WgVcY V1 VgZcZhh VcY gZejiVi^dc, M]ZhZ Wjh^cZhhZh Xd b eZiZ eg^b Vg^an 1^i] Xd b eVc^Zh i]Vi egdk^YZ gZVa+ZhiViZ [dXjhZY iZX]cdad\n* egdYjXih VcY hZgk^XZh ^c i]Z^g gZheZXi^kZ \Zd\gVe]^X b Vg`Zih*^cXajY^c di]Zg gZVa ZhiViZ VcY egdeZgin 1ZWh^iZh ^c : jhigVa^V* i]Z Nc^iZY LiViZh VcY : h^V,

GfSdTcZaeZ`_ JZUV` GVcgZTVd

M]Z

 $M]ZhZ egdk^{Y}Zgh ^{C}Xaj YZ BciZgcZi IgdidXda iZaZk^h^dc* dg BIMO* hjWhXg^ei^dc k^{Y}Zd+dc+YZ b VcY* dg LOH=* VcY WgdVYXVhi k^{Y}Zd+dc+YZ b VcY* dg ; OH=* hZgk^{XZh9 higZV b^{c} hZgk^{XZh d[[ZgZY i]gdj] Y^{iVa bZY^{ei^{d}c} k^{Y}Zd+dc+YZ b VcY* dg LOH=* VcY WgdVYXVhi k^{Y}Zd+dc+YZ b VcY* dg ; OH=* hZgk^{XZh9 higZV b^{c} hZgk^{XZh d[[ZgZY i]gdj] Y^{iVa bZY^{ei^{d}c} k^{Y}Zgh9 Vh 1Zaa Vh egd_gV b bZgh VcY Y^{hig^{W}}jidgh i] Vi egdk^{Y}Z XdciZci* ^{cXaj Y^{c} h b VaaZg* ad 1Zg+Xdhi dg [gZZ egd_gV b b^{c} eVX` V/Zh* Y^{b}ZXian id Xdchj bZgh dkZg i] Z ^{ciZgcZi, M]Z <d b eVcn WZa^{ZkZh i} Vi i] Z ?dmiZa @gdje^h egZ b^{j} b hZgk^{XZ} VcY ZmXajh^{kZ} XdciZci* 1^{YZ} VggVn d[egdY jXih VcY hZgk^{XZh* hZi+ide} Wdm [ZVijgZh i] Vi ZcVWaZ hjWhXg^{WZgh id gZXdgY* gZ 1^{cY* Y^{hXdkZg VcY 1 ViX} XdciZci* ^{ih ^{ciZ}gVi^{d}c d[i]^{g}Y+eVgin Veeh VcY ^{ih ^{c}Xhi bZci ^{c} c Hc = Zb VcY XVeVW^{a^{in} VcY egd_gV b b^{c} C CVWaZ ^{ii dd[[Zg hjWhXg^{WZgh V Xd b eZaa^{c} VaiZgcVi^{kZ} id ^{ih Xd b eZi^{id}gh, Bih higZV b^{c} hZgk^{XZh* i} CV DVnd Ledgih* 29> 75 % ?dmiZa Gd 1 VcY 6UJ/Q* egdk^{YZ V Y^{kZgh^{?ZY} edgi[da^{d} d[hjWhXg^{ei^{d}c iZaZk^{h^{d}ch Zgk^{XZh} i] Vi V ad 1 i] Z ?dmiZa @gdje id egdk^{YZ hZgk^{XZh} iVg Vi V 1^{YZ} gVc Z d[: jhigVa^{Vc} Xdchj bZgh,$

* TRSQAKIAM 7 EVR , HAMMEK

 $: G < deZgViZh c^{C}Z X]VcCZah VcY]Vh XVgg^VV Z g^{]ih [dg i 1 d VYY^i^dcVa X]VcCZah ^c : jhigVa^V [ZVijg^c i]Z aViZhi ^c cZ 1 h* eda^i^Xh* hedgih* ZciZgiV^c b Zci* e jWa^X V[[V^gh* Wjh^cZhh VcY 1ZVi]Zg, : G < ^h a^XZchZY Wn L`n BciZgcVi^dcVa : @ id jhZ L`n igVYZ b Vg`h VcY Yd b V^c cV b Zh ^c XdccZXi^dc 1^i] ^ih deZgVi^dc VcY Y^hig^Wji^dc d[X]VccZah VcY hZgk^XZh, : G < ^h X]VccZah Xdch^hi d[?dm Ledgih GZ 1 h* L`n GZ 1 h E^KZ* L`n GZ 1 h PZVi]Zg* L`n GZ 1 h >migV* L`n GZ 1 h >migV /* L`n GZ 1 h >migV 0* L`n GZ 1 h >migV 1* L`n GZ 1 h GZ 1 h Z ^dcVa, : G < X]VccZah VgZ Yhig^WjiZY i]gdj]dji : jhigVa^V VcY GZ 1 SZVaVcY VcY VkV^aVWaZ dc ?dmiZa VcY L`n GZ 1 h KZ ^dcVa ^h VkV^aVWaZ dc i]Z gZ ^dcVa ?M : PBG VcY Ldji]Zgc <gdh : jhiZgZd$

u $2J[[XWh \land 7[X^Y, M]Z; Vggdc \land @gdje [dXjhZh dc = d1 CdcZh Xdchj b Zg WgVcYh djih^YZ d[M]Z P Vaa LigZZi CdjgcVa [gVcX]^hZ* ^cXajY^c <math>2J[[XWh \land VcY F Vg`Zi P ViX]* V b dc \land di]Zg egdeZgi^Zh,$

 $\frac{2J[[XWh]}{2J[[XWh]} = 1]^{X} + VkV^{a}WaZ id hjWhXg^WZgh c eg^ci* dca^cZ VcY dc bjai^eaZ bdW^{a}Z YZk^XZh* YZa^kZgh cZ 1 h* VcVanh^h* ckZhi^{Vi^kZ} gZedgi^c * Xd beVcn egd[^aZh VcY ^ch^{]i[ja hiVi^{hi^Xh} [dg ^ckZhidgh VcY di]Zgh ^ciZgZhiZY ^ci]Z ^ckZhibZci 1 dgaY,$

 $= J[TN]GJ]LQ' F Vg^Zi P ViX]^h Vc^ckZhi^c VcY [^cVcX^Va cZ1h 1ZWh^iZ iVg \Zi^c VXi^kZ ^ckZhidgh, Bi Vahd egdk^YZh gZVa+i^bZ Xdb bZciVgn VcY ^ckZhi bZci iddah VcY YViV, IgdYjXih ^cXajYZ bdW^aZ Veeh VcY V gZhedch^kZ YZh^\c 1ZWh^iZ* VcY gZkZcjZ^h \ZcZgViZY i]gdj \] i]Z hVaZ d[VYkZgi^h^c * Vh 1Zaa Vh ^ih egZb^j b Y^\^iVa hjWhXg^ei^dc hZgk^XZ,$

- c 9W_N\JX[h\ 2^\RWN\\ 4JRUb #924\$, B; = egdk^YZh ^ckZhi^c\ XdciZci* VcVani^XVa egdYjXih VcY ZYjXVi^dcVa gZhdjgXZh id hjWhXg^WZgh ^c eg^ci VcY dca^cZ* Vh 1Zaa Vh i]gdj\] bdW^aZ Veeh VcY k^YZd, B; =~h hZgk^XZh ^cXajYZ i]Z BckZhidgh,Xd b 1ZWh^iZ* i]Z F Vg`ZiL b^i] VcY EZVYZg; dVgY b Vg`Zi gZhZVgX] VcY VcVanh^h iddah VcY V 1ZZ`an eg^ci ejWa^XVi^dc,
- u $DQN \ GJUU \ C][NN] : X^{WJU} \ ARPR]JU > N]^X[T \#GC: 4>$, PLC=G d[[Zgh VYkZgi^hZgh i]Z deedgi j c^in id gZVX] = d1 CdcZh-h VjY^ZcXZ VXgdhh V c j b WZg d[WgVcYh^*cXa jY^c PLC*; Vggdc-h VcY F Vg^Zi P ViX], PLC=G YdZh cdi ^cXa jYZ B; =,$
- u <<u>R</u>.N:X^[WJUR\V, M]Z =d1 CdcZh HZ\bZci d[[Zgh V cj bWZg d[^c+eZghdc VcY k^gijVa Xdc[ZgZcXZh VcY ZkZcih ZVX] nZVg, M]ZhZ a^kZ _djgcVa^hb ZkZcih d[[Zg VYkZgi^hZgh VcY hedchdgh i]Z deedgijc^in id gZVX] V hZaZXi \gdje d[^c[ajZci^Va aZVYZgh [gd b ^cYjhign* [^cVcXZ* \dkZgc bZci VcY eda^Xn, FVcn d[i]ZhZ egd\gV bh Vahd ZVgc gZkZcjZ [gd b eVgi^X^eVi^dc [ZZh X]Vg\ZY id ViiZcYZZh,

 $M]Z [daad l^c iVWaZ egdk^YZh^c[dg b Vi^dc gZ VgY^c VkZgV Z YV^an hjWhXg^ei^dch \&ZmXajY^c d[[+eaVi[dg b Y^hig^Wji^dc' Yjg^c i]Z VgY^c h]]$

	Dc2_e 5gVcRXV =ddfV FVRUVcdY2a ^{#+\$}	DRZU GfSdTcZSVcd ^{#, \$}	A`_eY]j ;]`SR] I_2bfV IdVcd ^{#.5}
$DQN C^W \#= XW d CJ $	0*0./*	G-:	/43 b^aa^dc
DQN C^W XW C^WMJb	0*0*	G-:	
DQN DRVN # = XW d CJ	766*	/30* ⪚^ci' ^{&1'} 223* &Y^\^iVa'	G-:
DQN C^WMJb DRVN\	/*310*	/71* ⪚^ci' ^{&1'} 223* &Y^\^iVa'	G-:

 ℓ' ; VhZY dc IjWa^h]Zgh : jY^AZcXZ FZVhjgZbZci < dbeVcn ℓ I : F < d | YViV [dg i]Z / 0 bdci]hZcYZY FVgX] 1/* 0.00,

&O' : h d[CjcZ1.*0.00* WVhZY dc ^ciZgcVa hdjgXZh VcY ^cXajY^c \ hjWhXg^WZgh id i]Z DRVN \ <R]N[J[b C^YYUNVNW] &{MEL | ', MdiVa hjWhXg^WZgh VXgdhh DQN DRVN \ VcY DQN C^WMJb DRVN * ^cXajY^c \ MEL* Vh d[CjcZ1.*0.00 1 Vh 443*...* ^cXajY^c \ 223*... Xadh^c \ Y^\iVa hjWhXg^WZgh, MdiVa [^ jgZh VgZ YZ+Yjea^XViZY [dg hjWhXg^WZgh 1]d gZXZ^kZ V eg^ci egdYjXi ZkZgn YVn d[i]Z 1ZZ^,</p>

&1' Bc VYY^i^dc id i]Z^g eg^ci VcY Y^\iVa+dcan egdYjXih* DQN DRVN\ VcY DQN C^WMJb DRVN\ hZaa eg^ci VcY Y^\^iVa egdYjXih WjcYaZY ^cid dcZ hjWhXg^ei^dc* 1]^X] ^h XdjciZY dcan dcXZ* jcYZg {eg^ci*| ^c i]Z iVWaZ VWdkZ,

&2' BcXaj YZh V\\gZ\ViZ jc^f jZ jhZgh VXXZhh^c\ 1 ZWh^iZh VcY b dW^aZ Veeh WVhZY dc @dd\aZ : cVani^Xh YViV [dg i]Z b dci] ZcYZY Cj cZ 1.* 0.00, LZZ { IVgi B, ; jh^cZhh z >meaVcVidgn GdiZ KZ\VgY^c\ <ZgiV^c F Zig^Xh, |</p>

7EV @NQJ 9NRS

GRI AdaY^c \h &{GRI |' ^h i]Z ej Wa^h]Zg d[i]Z >N ` $IX[T @X \] &i]Z {@X \] '* GRIdhi,Xd b* IV\ZL^m,Xd b* =ZX^YZg,Xd b VcY gZaViZY bdW^aZ Veeh VcY hdX^Va bZY^V X]VccZah, M]Z @X \] ^h i]Z daYZhi Xdci^cj dj han ej Wa^h]ZY YV^an cZ 1 heVeZg ^c i]Z N,L,* 1^i] V [dXjh dc XdkZgV\Z d[i]Z GZ 1 Rdg ` bZigdeda'iVc VgZV, M]Z @X \] egdk^YZh V kVg^Zin d[\ZcZgVa ^ciZgZhi XdciZci gVc \c \ [gd b WgZV `^c \ cZ 1 h id Wjh^cZhh VcVanh^h* VcY ^h ` cd 1 c ^c eVgi^XjaVg [dg ^ih Xd begZ]Zch^kZ hedgih XdkZgV\Z* [V bdjh]ZVYa^cZh VcY ^ih ^Xdc^X IV\Z L^m hZXi^dc* Vc Vji]dg^in dc XZaZWg^in cZ 1 h, M]Z eg^ci kZgh^dc d[i]Z @X \] ^h eg^b Vg^an Y^hig^W jiZY ^c GZ 1 Rdg ` * Vh 1Zaa Vh i]gdj \]dji i]Z Gdgi]ZVhi* ?adg^YV VcY <Va^{[dgc^V, ?dg i]Z i]gZZ bdci]h ZcYZY CjcZ 1.* 0.00* VkZgV\Z 1ZZ`YVn X^gXjaVi^dc WvhZY dc ^ciZgcVa hdjgXZh* ^cXajY^c \ bdW^aZ Vee Y^\iVa ZYi^dch* 1 Vh 256*30., Bc VYY^i^dc* i]Z Idhi =^\iVa GZi 1 dg `* 1]^X] ^cXaj YZh GR Idhi,Xd b* IV\ZL^m,Xd b VcY =ZX^YZg,Xd b* VkZgV\ZY Veegdm^b ViZan 0.1,/ b^aa^dc jc^fjZ jhZgh eZg bdci] Yjg^c \ i]Z fjVgiZg ZcYZY CjcZ 1.* 0.00VXXdgY^c \ i@dd\aZ : cVani^Xh, LZZ {IVgi B, ; jh^cZhh z >meaVcVidgn GdiZ KZ \VgY^c \ <ZgiV^c FZig^Xh| [dg ^c[dg bVi^dc gZ \VgY^c \ i]Z XVaXjaVi^dc d[jc^fjZ jhZgh,$

M]Z

g^\]ih id iZaZk^hZ XZgiV^c a^hiZY ZkZcih &[dg ZmV b eaZ* i]Z Han b e^X @V b Zh VcY XZgiV^c : jhigVa^Vc ?ddiWVaa EZV\jZ VcY Xg^X`Zi b ViX]Zh' j caZhh V cVi^dcVa dg Xd b bZgX^Va iZaZk^h^dc WgdVYXVhiZg 1]dhZ iZaZk^h^dc WgdVYXVhi^c \ hZgk^XZh XdkZg b dgZ i]Vc 3. # d[i]Z : jhigVa^Vc edejaVi^dc]Vh VXfj^gZY i]Z g^\]i id iZaZk^hZ i]Z ZkZci dg hjX] g^\]ih]VkZ cdi WZZc VXfj^gZY 04 1ZZ`h WZ[dgZ i]Z hiVgi d[i]Z gZaZkVci ZkZci VcY Vc ?M : WgdVYXVhiZg]Vh]VY V gZVhdcVWaZ deedgijc^in id VXfj^gZ i]Z g^\]ih id i]Vi ZkZci9 VcY &W' XdciZci gZfj^gZ bZcih z i]Z <db eVcn b jhi Xd b ean 1^i] XZgiV^c XdciZci gZfj^gZ bZcih* ^cXajY^c \ gZhig^Xi^dch dc i]Z ^cXajh^dc d[\VbWa^c \ VYkZgi^h^c \ Yjg^c \ a^kZ hedgi^c \ ZkZcih,

?dmiZa ^h Vahd hjW_ZXi id kVg^djh Xdchj bZg egdiZXi^dc gZ\^bZh jcYZg i]Z MZaZXd b bjc^XVi^dch : Xi /775 &<i]'* i]Z MZaZXd b bjc^XVi^dch : Xi /777 &<i]' VcY VhhdX^ViZY <dYZh* 1]^X] Veean id ?dmiZa~h egdk^h^dc d[WgdVYWVcY VcY kd^XZ hZgk^XZh id gZiV^a Xj hid bZgh,

 $M]Z < db eVcn + ijhigVa^Vc deZgVi^c | Wjh^cZhhZh VgZ hjW_ZXi id di]Zg eVgih d[i]Z ; gdVYXVhi^c | LZgk^XZh : Xi i]Vi bVn^beVXi i]Z < db eVcn + dl cZgh]^e higjXijgZ VcY deZgVi^dch VcY gZhig^Xi ^ih VW^a^in id iV^Z VYkVciV | Z d[VXfj^h^i^dc dg ^ckZhibZci deedgijc^i^Zh,$

2NWLQVJ[T BNP^UJ]RXW

<ZgiV^c WZcX] b Vg`h egdk^YZY Wn i]Z <d b eVcn-h HIBL Wjh^cZhh VgZ hj W_ZXi id gZ jaVi^dc ^c i]Z N,D, VcY b Vn WZXd b Z hj W_ZXi id h^b^aVg Zkdak^c \ gZ jaVi^dch ^c di]Zg _jg^hY^Xi^dch ^[* [dg ZmV b eaZ* hj X] WZcX] b Vg`h VgZ jhZY Wn hj eZgk^hZY Zci^i^Zh hj X] Vh igVY^c \ kZc jZh ^c i]Z Veea^XVWaZ _jg^hY^Xi^dc, M]ZhZ gZ jaVi^dch \ZcZgVaan gZf j^gZ* V b dc \ di]Zg i]^c \h* i]Vi WZcX] b Vg`h WZ egdk^YZY Wn Vc Vji]dg^oZY WZcX] b Vg` VY b^c^higVidg, P]^aZ i]Z <d b eVcn XjggZcian jhZh V i]^gY+eVgin VY b^c^higVidg* i]Z <d b eVcn ^ciZcYh id ZhiVwa^h] ^ih d l c WZcX] b Vg` VY b^c^higVidg* l]^X] 1^aa cZZY id Xd b ean 1^i] V 1^YZ+gVc \c hZi d[gZfj^gZ bZcih gZ jaVi^c * V b dc \ di]Zg i]^c \h* Xdc[a^Xih d[^ciZgZhi* Xd b eaV^ch] VcYa^c * ceji YViV* WZcX] b Vg` bZi]dYdad \Zh VcY di]Zg bViiZgh, : WZcX] b Vg` VY b^c^higVidg* l]^X] b Vn WZ jhZY ci]Z Veea^XVWaZ b Vg` Zi, M]Z HIBL Wjh^cZhh]Vh Vahd Va^\cZY ^ih d^a VcY Xd b b dY^i^Zh eg^XZ gZedgi^c \ 1^i] i]Z BciZgcVi^dcVa Hg Vc^hVi^dc d[LZXjg^i^Zh <d b b^hh^dc-h & BHL<H-h|' Ig^cX^eaZh [dg H^a KZedgi^c \ : \ZcX^zh* 1]^X] VgZ ciZcYZY id Zc]VcXZ i]Z gZa^VWa^n in d[d^a VcY Xd b b dY^in eg^XZ VhhZhh bZcih i]Vi VgZ gZ[ZgZcXZY ^c YZg^kVi^kZ XdcigVXih hj W_ZXi id gZ jaVi^c Wn BHL<H bZ bWZgh,</p>

4 J]J @[R_JLb JWM CNL^[R]b BNP^UJ]RXW

 $M]Z < db eVcn-h Wih^cZhh VXi^k^i^Zh VgZ hjW ZXi id aV lh VcY gZ \jaVi^dch \dkZgc^c \ i]Z XdaaZXi^dc* jhZ* h]Vg^c * egdiZXi^dc VcY$ gZiZci^dc d[eZghdcVa YViV* 1]^X] Xdci^cjZ id ZkdakZ VcY]VkZ ^b ea^XVi^dch [dg]d1 hjX] YViV ^h b VcV\ZY, ?dg ZmV b eaZ* ^c i]Z N,L,* XZgiV^c d[i]Z < d b eVcn-h 1ZWh^iZh* b dW^aZ Veeh VcY di]Zg dca^cZ W j h^cZhh VXi^k^i^Zh VgZ h j W_ZXi id i]Z < $a^2Z^-h Hca^cZ$ Ig^kVXn IgdiZXi^dc : Xi d[/776* 1]^X] egd]^W^ih i]Z XdaaZXi^dc d[eZghdcVa ^c[dg b Vi^dc dca^cZ [gd b X]^aYgZc jcYZg V\Z /1 1^i]dji eg^dg eVgZciVa XdchZci, Bc VYY^i^dc* i] Z ?ZYZgVa MgVYZ < db b^hh^dc Xdci^c jZh id ZmeVcY ^ih Veea^XVi^dc d[\ZcZgVa Xdch j bZg egdiZXi^dc aV l h id Xd b bZgX^Va YViV egVXi^XZh* ^cXaj Y^c \ id i]Z jhZ d[eZghdcVa VcY egd[^a^c \ YViV [gd b dca^cZ jhZgh id YZa^kZg iVg\ZiZY ^ciZgcZi VYkZgi^hZbZcih, F dgZ hiViZ VcY adXVa \dkZgcbZcih VgZ Vahd ZmeVcY^c* ZcVXi^c\ dg egdedh^c\ YViV eg^kVXn aV l h i]Vi \dkZgc i]Z XdaaZXi^dc VcY jhZ d[eZghdcVa YViV d[i]Z^g gZh^YZcih VcY ^cXgZVhZ eZcVai^Zh VcY ^c hd bZ XVhZh* V[[dgY eg^kViZ g^\]ih d[VXi^dc id ^cY^k^YjVah [dg [V^ajgZ id Xd bean* VcY b dhi hiViZh] VkZ ZcVXiZY aZ \^haVi^dc gZf j^g^c Wjh^cZhhZh id egdk^YZ cdi^XZ id hiViZ V\ZcX^Zh VcY id ^cY^k^YjVah 1]dhZ eZghdcVa ^c[dg b Vi^dc]Vh WZZc Y^hXadhZY Vh V gZhjai d[V YViV WgZVX], ?dg ZmV b eaZ* i]Z <Va^[dgc^V <dchj b Zg Ig^kVXn : Xi &{<<I : |' VcY <Va^[dgc^V Ig^kVXn K^\]ih : Xi &{<IK : |'* 1]^X] 1^aa Vb ZcY i]Z <<I : ^c CVcjVgn 0.01* ZhiVWa^h] XZgiV^c igVcheVgZcXn gjaZh* eji \gZViZg gZhig^Xi^dch dc]d1 i]Z <db eVcn XVc XdaaZXi* jhZ VcY h]VgZ $eZghdcVa^{c}[dg b Vi^{d}c d[<Va^{[}dgc^{V} gZh^{Y}Zcih VcY egdk^{Y}Z <Va^{[}dgc^{V} gZh^{Y}Zcih 1^{i}] XZgiV^{c} g^{]}]ih gZ^{V}gY^{c} i]Z^{a} eZghdcVa^{i} gZh^{i}Zich 1^{i}] XZgiV^{c} g^{]}$ YViV WgZVX]Zh, L^b^aVg aZ\^haVi^dc ^c O^g\^c^V* <dadgVYd* NiV] VcY <dccZXi^Xji* Vaa d[1]^X] 1^aa \d ^cid Z[[ZXi ^c 0.01* ^b edhZ igVcheVgZcXn VcY di]Zg dWa^\Vi^dch 1^i] gZheZXi id eZghdcVa YViV d[i]Z^g gZheZXi^kZ gZh^YZcih VcY egdk^YZ gZh^YZcih 1^i] h^b^aVg $g^{1} i^* 1^i i^2 ZmXZei^dc d[Veg^kViZg^{1}i d[VXi^dc],$

 $L^{b}aVg aV1h VcY gZ jaVi^{dch} VKZ WZZc ^{b}eaZ bZciZY ^{c} bVcn d[i]Z di]Zg _jg^{h}Y^{Xi^{dch}c 1}^{X} i]Z < dbeVcn deZgViZh^{c}XajY^{c} i]Z > jgdeZVc Nc^{dc} i]Z N,D, VcY : jhigVa^{V}, ?dg ZmV beaZ^{i}]Z > jgdeZVc Nc^{dc} VYdeiZY i]Z @ZcZgVa = ViV IgdiZXi^{dc} KZ jaVi^{dc} & {@=IK|^{i} 1}^{X} egdk^{Y}Zh V jc^{dg} b Zi d[gjaZh [dg eZghdcVa YViV egdXZhh^{c} i]gdj]djii]Z > jgdeZVc Nc^{dc} VcY i]Z N,D, VYdeiZY i]Z = ViV IgdiZXi^{dc} : Xi d[0./6 & i]Z {ND = I : |'Vh 1Zaa Vh i]Z ND @ZcZgVa = ViV IgdiZXi^{dc} KZ jaVi^{dc} & {ND @=IK |', M]Z @=IK^{ND} = I : VcY ND @=IK ZmeVcY i]Z gZ jaVi^{dc} d[i]Z XdaaZXi^{dc} egdXZhh^{c}^{i}jhZ^{i}h]Vg^{c} VcY hZXjg^{n} d[eZghdcVa YViV egdXZhh^{c} i]Z i]Z ci]Z ci]Z g^{j}in d[^{c}Y^{k}YjVah^{k}cXajY^{c} i]Z g^{j}in d[eZghdcVa YViV XdciV^{c}hig^{c} C CY hZXjg^{n} d[eZghdcVa YViV XdciV^{c}hig^{c} C CY hZXjg^{n} d[eZghdcVa YViV YZaZiZY jedc gZfjZhi^{i}Xdc^{i}gZ hg^{i}Xi i]Z igVch+WdgYZg [ad 1 d[hjX] YViV* gZfj^{g}Z Xd beVc^{A}h id XdcYjXi eg^{k}VXn ^b eVXi VhhZhh bZcih id ZkVajViZ YViV egdXZhh^{c} deZgVi^{dc} i]Vi VgZ a^{2}a^{2}a id gZhjai^{c} V]^{j}g^{h} id i]Z g^{j}ih VcY [gZZYd bh d[^{c}Y^{k}YjVah^{s} gZfj^{g}Z bVcYVidgn YViV WgZVX] gZedgi^{c} VcY cdi^{N}Vi^{dc} h^{c}h^{c}iXi dc^{N}b j b eZcVai^{Z}h [dg cdc+ Xd bea^{V}CXZ & je id 0. b^{aa}dc > jgdh dg /5 b^{aa}dc edjcYh^{k} Vh Veea^{X}VWaZ^{k} dg 2 # d[Vc Zci^{h}-h ldgaY1^{YZ} VccjVa ijgcdKZg^{c}i]Z egZXZY^{c} [^{C}VcX^{V}a nZVg^{s} 1]^{X}]ZkZg^{h}]^{1}Zg' VcY ^{C}XgZVhZ i]Z Zc[dgXZ bZci ed 1Zgh d[i]Z YViV egdZXi^{c} Vji]dg^{i}A, M]Z$

>ck^gdc b ZciVa* LdX^Va VcY @dkZgcVcXZ KZedgi* VkV^aVWaZ dc i]Z <d b eVcn~h 1ZWh^iZ & 1]^X] ^h cdi ^cXdgedgViZY Wn gZ[ZgZcXZ]ZgZ^c',

: h d[CjcZ1.*0.00*i]Z <d beVcn]VY Veegdm⁶ b ViZan 03*3.. Z beadnZZh*d[1]d b Veegdm⁶ b ViZan 7*... 1ZgZ adXViZY ⁶ c i]Z N,L,* 3*3.. 1ZgZ adXViZY ⁶ c i]Z N,D, VcY 6*... 1ZgZ adXViZY ⁶ c : j higVa⁶V, H[i]Z <d beVcn⁶ h Z beadnZZh* Veegdm⁶ b ViZan 2*... 1ZgZ gZegZhZciZY Wn kVg⁶d jh Z beadnZZ jc⁶dch, M]Z XdcigVXih 1⁶ j hjX] jc⁶dch 1⁶aa Zme⁶gZ Y jg⁶ kVg⁶d jh i⁶ b Zh dkZg i]Z cZmi hZkZgVa nZVgh, M]Z <d beVcn WZa⁶ZkZh ⁶ hi X jggZci gZaVi⁶dch]⁶ h 1⁶ j Z beadnZZh VgZ \ZcZgVaan \ddY,

, TKSTQE AMD >AKTER

M]Z YZa^kZgn d[f j Va^in cZ l h* ^c[dg b Vi^dc VcY ZciZgiV^c b Zci id X j hid b Zgh ^h V eVhh^dcViZ* eg^cX^eaZY VcY e j gedhZ[j a ZciZgeg^hZ, M]Z <db eVcn WZa^ZkZh eZdeaZ Vgd j cY i]Z \adWZ i j gc id GZ l h <dge WZXV j hZ i]Zn ig j hi ^h YZY^XVi^dc id i]dhZ kVa jZh VcY id XdcY jXi^c \ Wj h^cZhh 1^i] ^ciZ\g^in, M]Z <db eVcn ^h Va l Vnh b^cY[j a i]Vi dcZ d[^ih \gZViZhi VhhZih ^h ^ih gZe j iVi^dc* VcY Zi]^XVa XdcY jXi ^h eVgi d[i]Z k^h^dc* higViZ\n VcY [VWg^X d[i]Z <db eVcn, M]Z <db eVcn]Vh ZhiVWa^h]ZY V <db ea^VcXZ LiZZg^c \ <db b^iiZZ i]Vi dkZghZzh i]Z <db eVcn + \adWVa Xd b ea^VcXZ+gZaViZY eda^Xz^h* egdidXdah VcY \j^YVcXZ VcY gZedgih Y^gZXian id i]Z ; dVgY d[=^gZXidgh i]gd \] i]Z : jY^i <db b^iiZZ, IZg[dg b VcXZ dc Zi]^Xh VcY Xd b ea^VcXZ VcY di]Zg Zck^gdc b ZciVa* hdX^Va VcY \dkZgcVcXZ &{>L@|' dW_ZXi^kZh ^h ZkVajViZY ^c YZiZg b^c^c \ i]Z eVndji d[^cXZci^kZ Xd b eZchVi^dc [dg ZmZXji^kZd [[^XZgh, Bc VYY^i^dc* Vaa Z b eadnZZh VgZ gZf j^gZY id gZ \jaVgan Xd b eaZiZ igV^c \ dc* VcY V[[^g b Xd b ea^VcXZ 1^i]* GZ l h <dge-h LiVcYVgYh d[; jh^cZhh <dcYjXi* 1]^X] Xdc[^g b i]Z <db eVcn-h eda^Xn id XdcYjXi ^h V[V^gh c Xd b ea^VcXZ 1^i] Vaa Veea^XVWaZ aV l h VcY VeegdkZY Wn i]Z ; dVgY d[=^gZXidgh* VcY VgZ Xd b eaZ bZciZY Wn Wjh^cZhh+j c^i VcY ide^X+heZX^[^X eda^X/Zh VcY igV^c \h*cXajY^c \ 1^i] gZheZXi id 1 dg` eaVXZ XdcYjXi* Xdc[a^Xih d[^ciZgZhi* Vci^+Xdgg j ei^dc VcY Vci^+Wg^WZgn VcY ^ch^YZg igVY^c \,

- IUEQRISX\$. PTISX AMD 2MCKTRINM

 $M]Z < d b e V cn gZXd c^oZh i]Vi i]Z j c^f jZ ZmeZg^Z CXZh V cY eZgheZXi^kZh d[^ih Z b eadnZZh VXgdhh ^ih kVg^d jh W jh^cZhhZh VgZ Xg^i^XVa id XgZVi^c WgVcYh VcY egdY jXih i]Vi gZ[aZXi V Y^kZgh^in d[k^Z l ed^cih VcY Zc VV Z VcY ^che^gZ X jhid b Zgh Vaa dkZg i]Z l dgaY* VcY i]Z < d b e V cn hZZ `h id [dhiZg Vc Zck^gdc b Zci l]ZgZ Vaa Z b eadnZZh XVc [ZZa kVa jZY* ^cXa jYZY VcY Z b ed l ZgZY id Wg^c \ gZVi ^YZVh id i]Z iVWaZ, Md VX]^ZkZ i]^h* i]Z < d b e V cn hXd b b^iiZY id X jai^kVi^c \ Y^kZgh^in VcY Zf j^in VcY WgdVYZc^c \ deedgi jc^i^Zh [dg ^cXa jh^dc VcY] X = 0 C V C VcY + 0 C C VcY + 0 C V$

+QNADCARS ; TBRCQIBEQ , HTQM

 $M]Z < d b e V cn XVaXjaViZh ; gdVYXVhi LjWhXg^WZg <] jgc [dg ^ih e Vn+MO Wjh^cZhh Wn Y^k^Yc \ i]Z idiVa cj b WZg d[Y^hXdccZXiZY gZh^YZci^Va hjWhXg^WZgh [dg i]Z eZg^dY* cZi d[gZXdccZXih VcY igVch[Zgh* Wn i]Z : kZgV\Z ; gdVYXVhi LjWhXg^WZgh [dg i]Z eZg^dY* XVaXjaViZY Vh YZhXg^WZY VWdkZ, M]^h V b dj ci ^h i]Zc Y^k^YZY Wn i]Z cj b WZg d[YVnh ^c i]Z eZg^dY VcY b jai^ea^ZY Wn 143 YVnh id egZhZci X] jgc dc Vc Vccj Va WVh^h,$

9AID ; TBRCQIBEQR

: $eV^Y hjWhXg^WZg id i]Z < dbeVcn-h higZV b^c hZgk^XZh^h dcZ [dg 1]^X] i]Z < dbeVcn gZXd c^oZY hjWhXg^ei^dc gZkZcjZ, : hjWhXg^WZg XZVhZh id WZ V eV^Y hjWhXg^WZg Vh d[i]Z^g Z[[ZXi^kZ XVcXZaaVi^dc YViZ dg Vh V gZhjai d[V [V^aZY eVn bZci bZi]dY, IV^Y hjWhXg^WZgh ZmXajYZh Xjhid bZgh gZXZ^k^c hZgk^XZ [dg cd X]Vg Z jcYZg XZgiV^c cZ 1 hjWhXg^WZg egd bdi^dch,$

=H9A +5(F=G? : 57HCFG

IX^ \QX^UM LJ[NO^UUb LXW\RMN[]QN 0XUUX`RWP [R\T\ JWM X]QN[RW0X[VJ]RXW RW]QR\ 1 W W\'

b jai^i j YZ d[X]d^XZh* Xdch j b Zgh b Vn eaVXZ \gZViZg kVajZ dc i]Z XdckZc^ZcXZ VcY eg^XZ d[XdciZci VcY di]Zg egdY j Xih VcY hZgk^XZh i]Vc i]Zn Yd dc i]Z^g hd j gXZ* f j Va^in dg gZa^VW^a^in, Hca^cZ igV[[^X VcY egdY j Xi VcY hZgk^XZ e j gX]VhZh VgZ Vahd Yg^kZc Wn ^ciZgcZi hZVgX] gZh j aih* gZ[ZggVah [gd b hdX^Va b ZY^V VcY di]Zg eaVi[dg bh VcY k^h^W^a^in dc Y^\i& b Vg`ZieaVXZ eaVi[dg bh VcY ^c b dW^aZ Vee

M]Z Y^^iVa VYkZgi^h^c \ b Vg`Zi Vahd Xdci^cjZh id jcYZg \d X]Vc \Zh i]Vi b Vn [jgi]Zg ^ b eVXi Y^^iVa VYkZgi^h^c \ gZkZcjZh, Igd \gV b b Vi^X Wjn^c \ X]VccZah i]Vi Vaad 1 VYkZgi^hZgh id Wjn VjY^ZcXZh Vi hXVaZ eaVn V h^ c^[^XVci gdaZ ^c i]Z VYkZgi^h^c \ b Vg`ZieaVXZ VcY]VkZ XV jhZY VcY b Vn Xdci^cjZ id XV jhZ [jgi]Zg Yd 1 c 1 VgY eg^X^c \ egZhhjgZ VcY i]Z adhh d[V Y^gZXi gZaVi^dch]^e 1^i] b Vg`Zizgh, M]^gY+eVgin YZa^kZgn eaVi[dg bh b Vn Vahd aZVY id adhh d[Y^hig^Wji^dc VcY b dcZi^oVi^dc Xdcigda* adhh d[V Y^gZXi gZaVi^dch]^e 1^i] Xdchj b Zgh VcY VYkZghZan V[[ZXi i]Z <db eVcn~h VW^a^in id jcYZghiVcY ^ih VjY^ZcXZ VcY-dg XdaaZXi VcY Veean YViV [dg iVg\ZiZY VYkZgi^h^c \, M]Z <db eVcn~h Y^\iVa VYkZgi^h^c \ deZgVi^dch Vahd gZan dc V h b Vaa cj b WZg d[h^\c^[^XVci iZX] cdad \^Zh hjX] Vh @dd \aZ-h VY b VcV\Zg 1]^X]* ^[^ciZggj eiZY dg b ZVc^c \[jaan X]Vc \ZY* dg ^[i]Z egdk^YZgh aZkZgV\Z i]Z^g ed 1 Zg id VaiZg i]Z ZXdcd b^X higjXijgZ* XdjaY VYkZghZan ^b eVXi VYkZgi^h^c \ gZkZc jZh VcY-dg deZgVi^c \ Xdhih, Bc VYY^i^dc* Zkdak^c \ hiVcYVgYh [dg i]Z YZa^kZgn d[Y^\iVa VYkZgi^h^c * Vh 1 Zaa Vh i]Z YZkZade b Zci VcY ^ b eaZ b ZciVi^dc d[iZX] cdad \n* gZ \ jaVi^dch* eda^X^Zh VcY egVXi^XZh i]Vi VYkZghZan V[[ZXi i]Z <db eVcn-h W^a^in id YZa^kZg* iVg Zi dg b ZVhjgZ i]Z Z[[ZXi^kZcJhd [^ih VYkZgi^h^c * cXaj Y^c \ WadX^c \ i]Z Y^heaVn d[VYkZgi^h^c * Wg d h^c \ ^cXd \c^id* WadX^c \ dg YZai^c \ Xdd`^Zh VcY B I VYYgZhhZh* i]Z e]VhZ+dj id [hj eedgi [dg i]^gY eVgin Xdd`^Zh VcY b dW^aZ ^YZci^[^Zgh* Vh 1 Zaa Vh dei+^c gZf j^gZb Zcih VcY cZ 1 eg^kVXn gZ \ jaVi^dch* b Vn Vahd cZ \Vi^kZan ^ b eVXi Y^\iVa VYkZgi^h^c \ gZkZcjZh, : h i]Z Y^\iVa VYkZgi^h^c \ b Vg`Zi Xdci^c jZh idZ kdakZ* i]Z <db eVcn~h W^a^in id Xd b eZiZ hjXZhh[jaan [dg $hZgk^XZh^* i]Zn b Vn WZ jc1^aa^c \langle id egdk^YZ i]Z < d b eVcn 1^i] VXXZhh id XZgiV^c XdciZci, ?dg ZmV b eaZ^* ^c XdccZXi^dc 1^i] i]Z aVjcX] d[=^hcZn)^* =^hcZn gZ b dkZY ^ih =^hcZn+WgVcYZY b dk^Z X]VccZa VcY ^Yh X]VccZah^* Vh 1Zaa Vh XZgiV^c cdc+WgVcYZY XdciZci^* [gd b i]Z ?dmiZa eaVi[dg b, <dchda^YVi^dc V b dc \ XdciZci egdk^YZgh b Vn gZhjai ^c VYY^i^dcVa XdciZci WZXd b^c \ jcVkV^aVWaZ id i]Z <dbeVcn VcY-dg ^cXgZVhZ i]Z hXVaZ VcY aZkZgV \ Z d[i]dhZ egdk^YZgh, M]Z adhh d[g^]ih dg Vcn VYKZghZ X]Vc \ Zh id Zm^hi^c \ g^]ih^*$

aVg\Zhi gZhZaaZg d[^ih XVWaZ VcY hViZaa^iZ egdYjXih, : cn Y^hgjei^dc ^c i]Z hjeean d[i]dhZ hZgk^XZh dg V YZXa^cZ ^c MZahigV~h Wjh^cZhh XdjaY gZhjai ^c Y^hgjei^dch id i]Z hjeean d[* VcY-dg gZYjXZ i]Z cj b WZg d[hjWhXg^WZgh [dg* i]Z <d b eVcn~h egdYjXih VcY hZgk^XZh* 1]^X] XdjaY* ^c ijgc* VYkZghZan V[[ZXi ^ih Wjh^cZhh* gZhjaih d[deZgVi^dch VcY [^cVcX^Va XdcY^i^dc,

P]^aZ i]Z <d b eVcn 1^aa hZZ` VaiZgcVi^kZ hdjgXZh [dg i]Z egdYjXih VcY hZgk^XZh YZhXg^WZY VWdkZ 1]ZgZ edhh^WaZ VcY-dg eZg b ^hh^WaZ j cYZg Veea^XVWaZ V\gZZ b Zcih* ^i b Vn cdi WZ VWaZ id YZkZade i]ZhZ VaiZgcVi^kZ hdjgXZh fj^X`an VcY Xdhi+Z[[ZXi^kZan* 1]^X] XdjaY ^b eV^g ^ih VW^a^in id i^b Zan YZa^kZg ^ih egdYjXih VcY hZgk^XZh id ^ih hjWhXg^WZgh dg deZgViZ ^ih Wjh^cZhh,

1 Wb CRPWRORLJW] 9WL[NJ\N RW]QN 3X\]]X @[RW] JWM 4R\][RK^]N]QN 3XVYJWbh\ 2XXT\ JWM >N`\YJYN[\ X[4R\[^Y]RXW RW]QN 3XVYJWbh\ C^YYUb 3QJRW X[@[RW]RWP JWM 4R\][RK^]RXW 3QJWWNU\ VJb 1M_N[\NUb 100NL]]QN 3XVYJWbh\ 2^\RWN\\% BN\^U]\ X0 ? YN[J]RXW\ JWM 6RWJWLRJU 3XWMR]RXW'

 $I_g^ci^c \setminus VcY Y^hig^Wji^dc Xdhih^* ^cXajY^c \setminus i]Z Xdhi d[eVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h Wdd` VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcn~h VcY cZ l heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ [dg i]Z < db eVcN V h^\c^[XVci ZmeZchZ] heVeZg^* VgZ V h^\c^[^XVci ZmeZchZ] heVeZg^* VgZ V$ $ejWa^h]^c \ jc^ih, M]Z eg^XZ d[eVeZg]Vh]^hidg^XVaan WZZc kdaVi^aZ* VcY i]Z < db eVcn ZmeZXih^cXjZVhZh^c i]Z cZVg+iZg b [gd b]$ kVg^djh [VXidgh* ^cXajY^c \ Xdci^c jZY ^cXgZVhZh ^c h j eea^Zg deZgVi^c \ ZmeZchZh Y jZ id g^h^c \ gV1 b ViZg^Va* ZcZg \n* aVWdg VcY igVchedgiVi^dc VcY di]Zg Y^hig^Wji^dc Xdhih* ^c[aVi^dcVgn egZhhjgZh VcY di]Zg [VXidgh, M]Z <d b eVcn Vahd gZa^Zh dc i]^gY+eVgin hjeea^AZgh [dg YZa^AkZg^AZh d[eVeZg VcY dc i]^AgY+eVgin eg^Aci^Ac\ VcY Y^Ahig^AWji^Adc eVgicZgh id eg^Aci VcY Y^Ahig^AWjiZ ^Aih Wdd^Ah VcY cZ1 heVeZgh, = jg^c [^hXVa 0.00* c[aVi^dcVgn egZhh jgZh* aVWdg h]dgiV\Zh*]^\]Zg igVchedgiVi^dc Xdhih VcY YZaVnh VcY di]Zg h jeean X]V^c ^hhjZh ^cXgZVhZY i]Z Xdhi id eg^ci VcY Y^hig^WjiZ i]Z <d b eVcn~h Wdd`h VcY cZ l heVeZgh* eVgi^XjaVgan b Vcj[VXijg^c \ VcY $[gZ^{\}]i Xdhih Vi ^{ih} Wdd e jWa^{h}c Wjh^cZhh, M]ZhZ VcY di]Zg [VXidgh hjX] Vh [^cVcX^{a} egZhhjgZh ^cYjhign igZcYh dg ZXdcd b^Xh^{*}]$ $aVWdg jcgZhi*X]Vc \A c aV1h VcY gZ jaVi^dch* cVijgVa Y^hVhiZgh* ^cXajY^c \ZmigZ bZ 1ZVi]Zg & 1]^X] bVn dXXjg 1^i] ^cXgZVh^c$ [gZf jZcXn VcY ^ciZch^in'* eVcYZb^Xh VcY di]Zg 1^YZhegZVY]ZVai] Xg^hZh dg di]Zg X^gXj bhiVcXZh V[[ZXi^c\ i]ZhZ i]^gY+eVgin hjeea^Zgh VcY eg^ci VcY Y^hig^Wji^dc eVgicZgh XdjaY Xdci^cjZ id ^cXgZVhZ i]Z <d b eVcn~h eg^ci^c \ VcY Y^hig^Wji^dc Xdhih VcY XdjaY aZVY id Y^hgjei^dch* gZYjXZY deZgVi^dch dg Xdchda^YVi^dch $1^i]^c i]Z < db eVcn~h eg^ci^c \ VcY Y^hig^Wji^dc hjeean X]V^ch VcY-dg d[$ i]^gY+eVgin eg^ci h^iZh VcY-dg Y^hig^Wji^dc gdjiZh, M]Z <dbeVcn bVn cdi WZ VWaZ id YZkZade VaiZgcVi^kZ egdk^YZgh fj^X`an VcY Xdhi+ Z[[ZXi^kZan* 1]^X] XdjaY Y^hgjei eg^ci^c \ VcY Y^hig^Wji^dc deZgVi^dch dg ^cXgZVhZ i]Z Xdhi d[eg^ci^c \ VcY Y^hig^Wji^c \ i]Z <d b eVcn~h Wdd`h VcY cZ l heVeZgh, : cn h^\c^[^XVci ^cXgZVhZ ^c i]ZhZ Xdhih* jcYZghjeean dg h^\c^[^XVci Y^hgjei^dch ^c i]Z hjeean X]V^c dg i]Z <d b eVcn~h eg^ci^c VcY Y^hig^Wji^dc X]VccZah XdjaY]VkZ Vc VYkZghZ Z[[ZXi dc i]Z <d b eVcn~h Wjh^cZhh* gZh jaih d[deZgVi^dch VcY [^cVcX^Va XdcY^i^dc,

DQN 3XVYJWbh\ BNY^]J]RXW% 3[NMRKRUR]b JWM 2[JWM\ J[N ; Nb 1\\N]\ JWM 3XVYN]R]R_N 1M_JW]JPN\ JWM R]\ 2^\RWN\\ JWM BN\^U]\ X0 ?YN[J]RXW\ VJb KN 100NL]NM Kb 8X`]QN 3XVYJWb R\ @N[LNR_NM'

 $M]Z < db eVcn^{h} egdYjXih VcY hZgk^XZh VgZ Y^{hig}WjiZY jcYZg hd bZ d[i]Z 1 dgaY^{h} b dhi gZXd \c^{0}VWaZ VcY gZheZXiZY WgVcYh^{$ $^cXajY^c \ DQN GJW C][NN] : X^{WJU} VcY egZ b^Zg cZ 1 h WgVcYh^c : jhigVa^V VcY i]Z N,D,* = d 1 CdcZh^{*} AVgeZg < daa^{ch} I jWa^{h}]Zgh^{*} ?dmiZa^{*} gZVaZhiViZ,Xd b,Vj^{*} KZVaidg,Xd b^{**} HIBL VcY bVcn di]Zgh^{*} VcY i]Z < db eVcn WZa^{Z}kZh^{ih} h jXXZhh YZeZcYh dc^{ih} Xdci^{c} jZY VW^{a^{in} id} bV^{c}VcY c]VcXZ i]ZhZ WgVcYh, M]Z < db eVcn^{h} WgVcYh^{X}gZYW^{a^{in}} VcY gZe jiVi^{d}c XdjaY WZ YV bV \ZY Wn^{c}^{Y}Zcih i]Vi ZgdYZ Xdchj bZg VcY Xjhid bZg igjhi dg V eZgXZei^{d}c i]Vi i]Z < db eVcn^{h} egdYjXih VcY hZgk^XZh^{*} cXajY^{c} ^{ih}_djgcVa^{h} b^{*} egd \gV b b^{c} * gZVa ZhiViZ ^{c}[dg bVi^{d}c^{*} WZcX] bVg^{*} VcY eg^{X}c ^{k}Zh VcY di]Zg YViV VcY ^{c}[dg bVi^{d}c^{*} VgZ ad 1 fjVa^{in} j cgZa^{A}VWaZ dg [V^{a} id bV^{c}iV^{c} ^{c}YZeZcYZcXZ VcY ^{c}iZ \g^{in}, L^{c}^{^{h}XVci} cZ ^{Vi^{k}Z}XaV^{b} h dg ejWa^{X}nin gZ ^{VgY^{h}c} i]Z < db eVcn^{h} egdYjXih VcY hZgk^{h}Zzh YcY h VcY^{h} dch^{h} hdX^{Va} gZhedch^{W^{a}n} vcY ZgZcYZcXZ VcY ^{c}iZ ^{o}in, L^{c}^{^{h}XVci} cZ ^{Vi^{k}Z}XaV^{b} h dg ejWa^{A}Xnin gZ ^{VgY^{h}c} i]Z < db eVcn^{h} egdYjXih VcY hZgk^{h}XZh^{h} deZgVi^{h} KzX^{h} dch^{h} hdX^{Va} gZhedch^{W^{a}n} vcY XjaijgZ bVn YVb V/Z ^{h}dg gZejiVi^{h}c^{*} ZkZc^{-} [hjX] XaV^{h} bh VgZ jcigjZ, M]Z < db eVcn^{h} wgVcYh VcY gZejiVi^{h}c bVn A d 1$ gZ\jaVi^dch VcY eda^X^Zh VcY ediZci^Va VYkZghZ X]Vc\Zh i]ZgZid* ^cXajY^c\ [dgZ^\c iVm gZ\^bZh* [dgZ^\c d l cZgh]^e gZhig^Xi^dch* gZhig^Xi^dch dc gZeVig^Vi^dc d[[j cYh VcY [dgZ^\c XjggZcXn ZmX]Vc\Z* YViV eg^kVXn gZfj^gZ bZcih hjX] Vh i]Z @= IK* [dgZ^\c ^ciZaaZXijVa egdeZgin aV l h VcY adXVa aVWdg VcY Z b eadn bZci aV l h VcY gZ\jaVi^dch9 &3' Xd b ea^VcXZ 1^i] i]Z ?dgZ^\c <dggjei IgVXi^XZh : Xi* i]Z N,D, ;g^WZgn : Xi VcY di]Zg Vci^+Xdgjei^dc aV l h VcY gZ\jaVi^dch* Zmedgi Xdcigdah VcY ZXdcd b^X hVcXi^dch9 VcY &4' gZ\jaVidgn dg \dkZgc bZciVa VXi^dc V\V^chi i]Z <d b eVcn~h egdYjXih VcY hZgk^XZh hjX] Vh XZchdgh]^e dg di]Zg gZhig^Xi^dch dc VXXZhh* Zmejah^dc d[_djgcVa^hih dg di]Zg Z b eadnZZh VcY di]Zg gZiVa^Vidgn VXi^dch* ^cXajY^c\ Vh V gZhjai d[Y^hejiZh 1^i] i]Z N,L, >kZcih dg YZkZade bZcih gZaViZY id i]ZhZ VcY di]Zg g^h`h VhhdX^ViZY 1^i] i]Z <d b eVcn~h ^ciZgcVi^dcVa deZgVi^dch XdjaY gZhjai ^c hj^iVWaZ VYY^i^dch dg gZeaVXZ bZcih 1^i]dji h^\c^[^XVci Xdhih dg YZaVnh* eVgi^XjaVgan Vh ^i Xdci^cjZh id [dXjh dc ^ih Y^\iVa egdYjXih VcY hZgk^XZh, M]ZhZ g^h`h]VkZ WZZc ZmVXZgWViZY Wn gZXZci aVWdg XdchigV^cih VcY ^c[aVi^dcVgn egZhhjgZh dc Z b eadnZZ 1 V\Zh VcY WZcZ[^ih* 1]^X] ^cXgZVhZY Z b eadnZZ ijgcdkZg VcY gZXgj^ic \ VcY gZiZci^dc Xdhih ^c hd bZ [jcXi^dcVa VgZVh VcY Wjh^cZhhZh Yjg^c \ [^hXVa 0.00, <]Vc\Zh ^c i]Z cVijgZ d[i]Z d[[^XZ Zck^gdc bZci VcY 1 dg`^c \ VggVc\ZbZcih b Vn* ^c hd bZ ^chiVcXZh* Vahd b V`Z ^i b dgZ Y^[[^Xjai id]^gZ VcY gZiV^c fjVa^[^ZY Z b eadnZZh ^[i]Z <d b eVcn-h cZZYh VgZ cdi Va^\cZY 1^i] YZ b VcY [dg [aZm^Wa^in dg Vh V gZhjai d[1 dg`eaVXZ XjaijgZ X]VaaZc \Zh YjZ id gZ b diZ 1 dg`^c \, M]Z adhh d[`Zn Z b eadnZZh* i]Z [V^ajgZ id ViigVXi VcY gZiV^c di]Zg]^]an fjVa^[^ZY eZghdccZa dg]^]Z gXdhih VhhdX^ViZY 1^i] i]ZhZ Z[[dgih* XdjaY]Vg b i]Z <d b eVcn-h Wjh^cZhh* ^cXajY^c \ i]Z VW^a^in id ZmZXjiZ ^ih Wjh^cZhh higViZ \n* VcY cZ \Vi^kZan ^b eVXi ^ih gZhjai hd[deZgVi^dch,

DQN 3XVYJWb R\ C^KSNL]]X @JbVNW] @[XLN\\RWP BR\T GQRLQ 3X^UM <NJM]X 1M_N[\N 500NL]\ XW]QN 3XVYJWbh\ 2^\RWN\\ JWM BN\^U]\ X0 ?YN[J]RXW\'

M]Z <d b eVcn-h X jhid b Zgh eVn [dg ^ih egdY jXih VcY hZgk^XZh jh^c \ V kVg^Zin d[Y^[[ZgZci eVn b Zci b Zi]dYh* ^cXajY^c \ XgZY^i VcY YZW^i XVgYh* egZeV^Y XVgYh* Y^gZXi YZW^i* dca^cZ 1 VaaZih VcY i]gdj \] Y^gZXi XVgg^Zg VcY eVgicZg W^aa^c \, M]Z <d b eVcn gZa^Zh dc ^ciZgcVa VcY i]^gY eVgin hnhiZ bh id egdXZhh eVn b Zci, : XXZeiVcXZ VcY egdXZhh^c \ d[i]ZhZ eVn b Zci b Zi]dYh VgZ hjW_ZXi id XZgiV^c gjaZh VcY gZ \jaVi^dch VcY gZfj^gZ eVn b Zci d[^ciZgX]Vc \Z VcY di]Zg [ZZh, Md i]Z ZmiZci i]ZgZ VgZ ^cXgZVhZh ^c eVn b Zci egdXZhh^c \ [ZZh* b ViZg^Va X]Vc \Zh ^c i]Z eVn b Zci ZXdhnhiZ b* YZaVnh ^c gZXZ^k^c \ eVn b Zci hg b eVn b Zci egdXZhhdgh* Vcn [V^ajgZh id Xd b ean 1^i]* dg X]Vc \Zh id gjaZh dg gZ \jaVi^dch XdcXZgc^c \ eVn b Zci * adhh d[eVn b Zci egdYzhhdgh* Vcr] egXZhdch dg [V^ajgZh c' eggXZhh^c \ eVn b Zci i]Zg VgZ ^cXgZVhZh hdgh* Vcr] egXZhhdch XdcXZgc^c \ eVn b Zci * adhh d[eVn b Zci egdYzhhdgh* vcr] egXZhhdch XdjaZh c'* dg [gV jY jaZci jhZ d[dg VXXZhh id* eVn b Zci egdXZhh^c \ hnhiZ bh dg eVn b Zci egdY jXih* i]Z <d b eVcn-h gZhjaih d[deZgVi^dch Xd jaY WZ VYkZghZan ^b eVXiZY VcY ^i XdjaY hj[[Zg gZejiVi^dcVa]Vgb, ?jgi]Zg b dgZ* ^[i]Z <d b eVcn ^h j cVWaZ id b V^ciV^c ^ih [gV jY vcY X]Vg \ZWX gViZh Vi VXXZeiVWaZ aZkZah* XVgY cZi l dg `h bVn ^b edhZ [^cZh VcY ^ih XVgY VeegdkVa gViZ bVn WZ ^b eVXiZY, M]Z iZg b^cVi^dcd [i]Z <d b eVcn-h VW^a^in id egdXZhh eVn bZcih dc Vcn bV_dg eVn bZci bZi]dY 1 djaY VYkZghZan V[[ZXi ^ih Wjh^cZhh VcY gZh jaih d[deZgVi^dch,

 $<\!\!JKX[4R Y^]N = Jb 8J_N JW 1M_N[N 500NL] XW]QN 3XVYJWbh 2^RWN V'$

Bc hd b Z d[i]Z <d b eVcn~h Wjh^cZhhZh* ^i Zc\V\Zh i]Z hZgk^XZh d[Z b eadnZZh 1]d VgZ hjW_ZXi id XdaaZXi^kZ WVg\V^c^c\ V\gZZ b Zcih, B[i]Z <d b eVcn ^h j cVWaZ id gZcZ1 Zme^g^c\ XdaaZXi^kZ WVg\V^c^c\ V\gZZ b Zcih* ^i ^h edhh^WaZ i]Vi i]Z V[[ZXiZY jc^dch XdjaY iV`Z VXi^dc ^c i]Z [dg b d[hig^`Zh dg 1 dg` hideeV\Zh, LjX] VXi^dch* Vh 1Zaa Vh]^\]Zg Xdhih ^c XdccZXi^dc 1^i] i]ZhZ XdaaZXi^kZ WVg\V^c^c\ V\gZZ b Zcih dg V h^\c^[^XVci aVWdg Y^hejiZ* XdjaY]VkZ Vc VYkZghZ Z[[ZXi dc i]Z <d b eVcn~h Wjh^cZhh Wn XVjh^c\ YZaVnh ^c egdYjXi^dc dg Wn gZYjX^c\ egd[^i b Vg\ch* VcY i]ZhZ g^h`h b Vn WZ ZmVXZgWViZY Wn gZXZci aVWdg XdchigV^cih VcY ^c[aVi^dcVgn egZhhjgZh dc Z b eadnZZ 1 V\Zh VcY WZcZ[^ih,

A RTc`VT`_` ^ ZT R_U A Rc\Ve FZd\d

 $GNJT \ 4XVN | JRL \ JWM \ 7 UXKJU \ 5 LXWXVRL \ 3 XWMR | JWM \ FXUJ | JWM \ 4 R | [^Y]RXW \ RW \] QN \ 6 RWJWLRJU \ JWM \ ? \] QN [= J[TN] | = Jb \ IM_N[NUb \ 100NL] \] QN \ 3 XVYJWbh \ 2^RWN | '$

φ X i

>kZcih V[[ZXi^c\ i]Z <d b eVcn~h hnhiZ b h dg di]Zg iZX]cdad\^Zh* dg i]dhZ d[i]^gY eVgi^Zh jedc 1]^X] i]Z <d b eVcn~h Wjh^cZhh gZa^Zh* hjX] Vh Xd b e jiZg Xd b egd b ^hZh* XnWZg i]gZVih VcY ViiVX`h* Xd b e jiZg k^gjhZh* 1 dg bh dg di]Zg YZhigjXi^kZ dg Y^hgjei^kZ hd[i 1 VgZ* egdXZhh WgZV`Yd 1 ch* gVchd b 1 VgZ VcY YZc^Va d[hZgk^XZ ViiVX`h* bVa^XA'djh hdX^Va Zc\^cZZg^c\ dg di]Zg bVa^XA'djh VXi^k^i^Zh Wn ^cY^kA'j j Vah dg hiViZ+hedchdgZY dg di]Zg \gdjeh* dg Vcn Xd bW^cVi^dc d[i]Z [dgZ\d^c* Vh 1 Zaa Vh ed 1 Zg VcY ^ciZgcZi djiV\Zh* Zf j^e b Zci [V^ajgZ* cVijgVa Y^hVhiZgh* ^cXajY^c\ ZmigZ bZ 1 ZVi]Zg & 1]^X] b Vn dXXjg 1^i] ^cXgZVh^c\ [gZfjZcXn VcY ^ciZcch^in '* iZggdg^hi VXi^k^i^Zh* 1 Vg*]j b Vc dg iZX]cdad\^XVa Zggdg dg bVa[ZVhVcXZ i]Vi b Vn V[[ZXi hjX] hnhiZ bh* XdjaY gZhjai ^c Y^hgjei^dc d[i]Z <d b eVcn~h hZgk^XZh VcY Wjh^cZhh VcY-dg adhh* Xdggjei^dc* ^b egdeZg VXXZhh id dg Y^hXadhjgZ d[eZghdcVa YViV* Wjh^cZhh ^c(dg b Vi^dc* ^cXajY^c\ ^ciZaaZXij Va egdeZgin* dg di]Zg Xdc[^YZci^Va ^c[dg b Vi^dc, NcVji]dg^OZY eVgi^Zh b Vn Vahd [gVj Y jaZcian ^cY jXZ i]Z <d b eVcn~h Zb eadnZZh dg di]Zg V\Zcih id Y^hXadhZ hZch^i^kZ dg Xdc[^YZci^Va ^c[dg b Vi^dc ^c dgYZg id \Vc

hjggdjcYh i]Z^g hXdeZ VcY Veea^XVi^dc, F dgZdkZg* YViV eg^kVXn VcY hZXjg^in aV l h bVn ediZci^Vaan Xdc[a^Xi [gdb_jg^hY^Xi^dc id _jg^hY^Xi^dc, <d bean^c \ 1^i] i]ZhZ aV l h VcY gZ \ jaVi^dch Xd jaY WZ Xdhian VcY gZhd jgXZ+^ciZch^kZ* gZ f j^gZ i]Z <d beVcn id X]Vc \ Z ^ih Wj h^cZhh egVXi^XZh* dg a^b^i dg gZhig^Xi VheZXih d[i]Z <d beVcn~h Wj h^cZhh ^c V bVccZg VYkZghZ id ^ih Wj h^cZhh deZgVi^dch* ^cXaj Y^c \ Wn ^c]^W^i^c \ dg egZkZci^c \ i]Z XdaaZXi^dc d[^c[dg bVi^dc i]Vi ZcVWaZh^i id iVg \Zi VcY bZVhjgZ i]Z Z[[ZXi^kZcZhh d[VYkZgi^h^c \, M]Z <d beVcn~h [V^ajgZ id Xd bean* ZkZc ^[^cVYkZgiZci dg ^c \ ddY [V^i]* dg Vh V gZhjai d[V Xd begd b^hZ* WgZVX] dg ^ciZggjei^dc d[i]Z <d beVcn~h hnhiZ bh Wn V i]^gY eVgin* Xd jaY gZh jai ^c Zmedh jgZ id Zc[dgXZ bZci Wn N,L, [ZYZgVa* hiViZ dg adXVa dg [dgZ^\c \ dkZgc bZcih dg eg^kViZ eVgi^Zh* Vh 1Zaa Vh h^\c^[^XVci cZ \Vi^kZ ejWa^Xin VcY gZejiVi^dcVa YV bV \Z, >mV beaZh d[h jX] aV 1h ^cXaj YZ i]Z >jgdeZVc Nc^dc~h @= IK VcY i]Z ND = I : VcY ND @= IK* ZVX] d[1]^X] ZmeVcYh i]Z gZ \ jaVi^dc d[eZghdcVa YViV egdXZhh^c \ DQN

id Vh V XdkZgZY hidX`]daYZg* VgZ dg b Vn WZXd b Z hidX`]daYZgh* Y^gZXidgh* d[[^XZgh* Z b eadnZZh dg V\Zcih d[?HQ VcY XZgiV^c d[^ih V[[^a^ViZh, M]Z <d b e Vcn^h : b ZcYZY VcY KZhiViZY ; n+aV1h [jgi]Zg egdk^YZ i]Vi Vcn hjX] dkZgaVee^c eZghdc 1^aa cdi WZ a^VWaZ id i]Z <d b e Vcn* dg id Vcn d[^ih hidX`]daYZgh* [dg WgZVX] d[Vcn [^YjX^Vgn Yjin i]Vi 1 djaY di]Zg1^hZ Zm^hi WZXVjhZ hjX] ^cY^k^YjVa Y^gZXih V XdgedgViZ deedgijc^in &di]Zg i]Vc XZgiV^c ineZh d[gZhig^XiZY Wjh^cZhh deedgijc^in^zh hZi [dgi] ^c i]Z <d b e Vcn* : b ZcYZY VcY KZhiViZY ; n+aV1h' id ?HQ ^chiZVY d[i]Z <d b e Vcn, M]^h XdjaY gZhjai ^c Vc dkZgaVee^c eZghdc hjWb^ii^c Vcn XdgedgViZ deedgijc^in^Zh di ?HQ ^chiZVY d[i]Z <d b e Vcn, M]^h XdjaY gZhjai ^c Vc dkZgaVee^c, eZghdc hjWb^ii^c Vcn XdgedgViZ deedgijc^in^Zh di ?HQ ^chiZVY d[i]Z <d b e Vcn, M]^h XdjaY d[i]Z <d b e Vc

3N[]JRW @[X_R\RXW\ X0]QN 3XVYJWbh\ BN\]J]NM 3N[]RORLJ]N X0 9WLX[YX[J]RXW JWM 1 VNWMNM JWM BN\]J]NM 2b&UJ`\ JWM]QN ?`WN[\QRY X0]QN 3XVYJWbh\ 3XVVXW C]XLT Kb]QN = ^[MXLQ 6JVRUb D[^\] = Jb 4R\LX^[JPN DJTNX_N[\% JWM]QN 3XWLNW][J]RXW X0 ?`WN[\QRY GRUU 100NL]]QN FX]RWP BN\^U]\ X0 = J]]N[\ C^KVR]]NM 0X[C]XLTQXUMN[1YY[X_JU'

 $M]Z < d b e V cn h KZhiViZY < Zgi^{^XViZ} d[BcXdgedgVi^dc VcY : b ZcYZY VcY KZhiViZY ; n+aV l h XdciV^c XZgiV^c Vci^+iV`ZdkZg egdk^h^dch i]Vi b Vn b V`Z b dgZ Y^[^Xjai dg ZmeZch^kZ V iZcYZg d[[Zg* X]Vc\Z ^c Xdcigda* dg iV`ZdkZg ViiZ b ei i]Vi ^h deedhZY Wn i]Z < d b e V cn h ; dVgY d[=^gZXidgh dg XZgiV^c hidX`]daYZgh]daY^c V h^c^[^XViz eZgXZciV\Z d[i]Z kdi^c \ ed l Zg d[i]Z < d b e V cn h dj ihiVcY^c \ kdi^c \ hidX`, Bc e Vgi^XjaVg* i]Z < d b e V cn h KZhiViZY < Zgi^[^XViZ d[BcXdgedgVi^dc VcY : b ZcYZY VcY KZhiViZY ; n+aV l h egdk^YZ [dg* V b dc \ di]Zg i]^c \ h8$

- u V Y j Va XaVhh Xd b b dc Zf j^in XVe^iVa hig j Xi j gZ9
- u Vegd]^W^i^dc dc hidX`]daYZgh iV`^c\ Vcn VXi^dc Wn 1g^iiZc XdchZci 1^i]dji V bZZi^c\9
- $i]Z gZfj^gZbZcii]Vi hidX^]daYZgh ^kZi]Z < d b eVcn VYkVcXZ cdi^XZid cd b^cViZ XVcY^YViZh [dg ZaZXi^dc id i]Z; dVgY d[=^gZXidgh dg id b^Z hidX^]daYZg egdedhVah Vi V hidX^]daYZgh~ bZZi^c 9$
- $u \quad i]Z \ gZf \ j^gZ \ bZci \ d[\ Vc \ V[[^g \ b \ Vi^kZ \ kdiZ \ d[\ Vi \ aZVhi \ 43 \ \# \ d[\ i]Z \ kdi^c \setminus \ ed \ IZg \ d[\ i]Z \ <d \ b \ eVcn-h \ d \ jihiVcY^c \setminus \ kdi^c \setminus \ hidX^{\ id Vb \ ZcY \ dg \ gZeZVa \ ^ih \ Wn+aV \ I \ h9 }$
- u kVXVcX^Zh dc i]Z ; dVgY d[=^gZXidgh id WZ [^aaZY dcan Wn V b V_dg^in kdiZ d[Y^gZXidgh i]Zc ^c d[[^XZ9
- u XZgiV^c gZhig^Xi^dch dc i]Z igVch[Zg d[i]Z <d b eVcn~h h]VgZh9 VcY
- u i]Z; dVgY d[=^gZXidgh id ^hhjZ* 1^i]dji hidX`]daYZg VeegdkVa* IgZ[ZggZY LidX` VcY LZg^Zh <db b dc LidX` 1^i] hjX] iZg b h Vh i]Z; dVgY d[=^gZXidgh b Vn YZiZg b^cZ,

 $M]ZhZ egdk^h^dch XdjaY Y^hXdjgV Z ediZci^Va VXfj^h^i^dc egdedhVah VcY XdjaY YZaVn dg egZkZci V X]Vc Z^c Xdcigda d[i]Z < d b eVcn^* ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^]daYZgh b Vn Xdch^YZg hjX] egdedhVah^* [Z[[ZXi^kZ^* YZh^gVWaZ, V]Vc Z^c Xdcigda d[i]Z < d b eVcn^* ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^] daYZgh b Vn Xdch^YZg hjX] egdedhVah^* [Z[[ZXi^kZ^* YZh^gVWaZ, V]Vc Z^c Xdcigda d[i]Z < d b eVcn^* ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ i]Z XVhZ 1]ZgZ V b V_dg^in d[i]Z hidX^2 ZkZc ^c i]Z XVhZ i]$

Bc VYYⁱ^Adc^{*} Vh V gZhjai d[]^Ah VW^a^Ain id Veed^Aci XZgiV^Ac bZbWZgh d[i]Z WdVgY d[Y^AgZXidgh d[i]Z XdgedgViZ igjhiZZ d[i]Z F jgYdX] ?V b^Aan Mgjhi & F ?M'^{*} 1]^AX] WZcZ[^AX^Avan d1 ch aZhh i]Vc dcZ eZgXZci d[i]Z <d b eVcn⁻h djihiVcY^Ac \ <aVhh : <d b bdc LidX` VcY Veegdm^A b ViZan 16,7 # d[i]Z <d b eVcn⁻h <aVhh ; <d b bdc LidX` Vh d[CjcZ 1.* 0.00* D, KjeZgi F jgYdX] b Vn WZ YZZ bZY id WZ V WZcZ[^AX^Avan d1 cZg d[i]Z F ?M, D, KjeZgi F jgYdX]*]d 1ZkZg^{*} Y^AXaV^Abh Vcn WZcZ[^AX^Ava d1 cZgh]^{*}e

F ?M ldjaY [dg[Z^i kdiZh id i]Z ZmiZci cZXZhhVgn id ZchjgZ i]Vi i]Z F ?M VcY i]Z F jgYdX] [V b^an XdaaZXi^kZan Yd cdi ZmXZZY 22 # d[i]Z djihiVcY^c kdi^c ed lZg d[i]Z h]VgZh d[<aVhh ; <db bdc LidX`* ZmXZei 1]ZgZ V F jgYdX] [V b^an bZ b WZg kdiZh i]Z^g d l c h]VgZh Y^[[ZgZcian [gdb i]Z F ?M dc Vcn bViiZg,

=H9A +6(IBF9GC@J98 GH5:: 7CAA9BHG

GdcZ,

=H9A, (DFCD9FH=9G

 $2, \qquad M]Z < d \, b \, eV cn + d \, 1 \, cZY \, eg^{ci} \, XZ ciZg \, VcY \, d[[^{X}Z \, Wj^{a}Y^{c} \setminus ^{c} ; g^{h}WVcZ^{*} : jhigVa^{V} \, Vi \, 1 \,]^{X}]$

D5FH ==

=H9A /(A 5F ? 9H : CF F9 ; =GHF 5BHrG 7 CA A CB 9E I =HM& F9@ 5H98 GHC7 ? < C@89F A 5HH9FG 5B8 =GG I 9F D I F7 < 5G9G C : 9E I =HM G97 I F=H=9G

 $\begin{array}{l} GZ1h < dgedgVi^dc^h < a^Vhh : <db b dc LidX^ VcY < a^Vhh ; <db b dc LidX^ VgZ a^hiZY VcY igVYZY dc M]Z GVhYVf @adWVa LZaZXi F Vg^Zi & GVhYVf | '* ^ih eg^cX^eVa b Vg^Zi ; j cYZg i]Z hn b Wdah & G PL : | VcY & G PL*| gZheZXi^kZan, <A>LL = Zedh^iVgn BciZgZhih & & <=Bh|' gZegZhZci^c | i]Z < d b e^Vcn^h < a^Vhh : <db b dc LidX^ VcY < a^Vhh ; <db b dc LidX^ VgZ a^hiZY VcY igVYZY dc i]Z : j higVa^Vc LZX jg^i^Zh >mX] Vc | Z & : LQ | ' j cYZg i]Z hn b Wdah & G PLEO | VcY & G PL*| gZheZXi^kZan, :h d[: j | j hi 3* 0.00* i]ZgZ 1 ZgZ \\ Veegdm^b ViZan / 4* ...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh : <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[gZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[sZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[sZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[sZXdgY d[h] VgZh d[<aVhh ; <db b dc LidX^ VcY 2...] daYZgh d[sZXdgY d[h] VgZh d[<aVhh ; $

- IUIDEMDR

 $?dg \ c[dg \ b \ Vi^{d}c \ gZ \ VgY^{c} \ Y^{k^{Y}ZcYh^{*} hZZ} \ GdiZ \ / 0 \ z \ LidX^{]} daYZgh^{} > fj^{in} \ c \ i]Z \ VXXd \ b \ eVcn^{c} \ < dchda^{YViZY} \ ?^{c}VcX^{Va} \ LiViZb \ Zcih,$

2RRTEQ 9TQCHARER NF . PTISX ; ECTQISIER

	H`eR] Bf ^ SVc `W GYRcVd DfcTYRdVU ' 7]Rdd 5 ^{#Rs}	H`eR] Bf ^ SVc `W GYRcVd DfcTYRdVU ' 7]Rdd 6 ^{#R\$}	Do DV	5gVcRXV c/TV DR/U c GYRcV ']Rdd 5 ^{#S\$}	Do DV	5 gVcRXV 2TV DRZU c GYRcV ']Rdd 6 ^{#SS}	H`eR] Bf ^ SVc `W GYRcVd DfcTYRdVU Rd DRce `W DfS][ZT]j 5`f_TVU Dc`XcR ^	ĤY Df	c JR]fV `W GYRcVd /Re ARj MVe 6V cTYRdVU I_UVc]/[]] 5`f_TVU Dc`XcR^ #58
			#Z_	_ ^ Z]]Z`_d&	ViTV	ae aVc dYR	cV R ^ ` f_ed\$		
F VgX] $06^* 0.00 + : eg^a 02^* 0.00$.,6	.,2	"	0/,50	"	00,.6	/,0	"	626
: eg^a $03^* 0.00 + F Vn 07^* 0.00$.,1	. ,0	"	/6,73	"	/7,/0	.,3	"	615
F Vn 1.*0.00 + C j an .1*0.00	.,6	.,2	"	/3,3.	"	/3,57	/,0	"	6/5
MdiVa	/,7	/,.	"	/6,33	"	/6,6/	0,7		

 $\label{eq:main_state} M]Z \ [daad 1^c \ iVWaZ \ YZiV^{ah} \ djg \ bdci] an \ h]VgZ \ gZe jgX]VhZh \ Yjg^c \ i]Z \ i]gZZ \ bdci]h \ ZcYZY \ CjcZ \ 1.* \ 0.008$

=H9A 1(A 5B5; 9A9BHrG 8=G7 IGG=CB 5B8 5B5@MG=G C: :=B5B7=5@ 7CB8=H=CB 5B8 F9G I@HG C: CD9F5H=CBG

DQR\ MR\L^\\RXW JWM JWJUb\R\ LXW]JRW\ \]J]NVNW]\]QJ] LXW\]R]^]N f0X[`J[M&UXXTRWP \]J]NVNW]\g`R]QRW]QN VNJWRWP X0 CNL]RXW +*5 X0]QN CNL^[R]RN\ 5aLQJWPN 1L] X0 */, -% J\ JVNWMNM #]QN f5aLQJWPN 1L]g\$% JWM CNL]RXW +. 1 X0]QN CNL^[R]RN\ 1L] X0 */, ,% J\ JVNWMNM' 1UU \]J]NVNW]\]QJ] J[N WX] \]J]NVNW]\ X0 QR\]X[RLJU 0JL] J[N 0X[`J[M&UXXTRWP \]J]NVNW]\'DQN`X[M\ fNaYNL]%g f`RU%g fN\]RVJ]N%g fJW]RLRYJ]N%g fY[NMRL]%g fKNURN_N%g f\QX^UMg JWM \RVRUJ[NaY[N\\RXW\ JWM _J[RJ]RXW\]QN[NX0 J[N RW]NWMNM]X RMNW]R0b 0X[`J[M&UXXTRWP \]J]NVNW]\'DQN\N \]J]NVNW]\ JYYNJ[RW J W^VKN[X0 YUJLN\ RW]QR \MR\L^\\RXW JWM JWJUb\R\ JWM RWLU^MN \]J]NVNW]\ [NPJ[MRWP]QN RW]NW]% KNURN0 X[L^[[NW] NAYNL]J]RXW\ X0]QN 3XVYJWb% R]\ MR[NL]X[\ X[R]\ X00RLN[\`R]Q [N\YNL]]X% JVXWP X]QN[]QRWP\%][NWM\ J00NL]RWP]QN 3XVYJWbh\ 0RWJWLRJU LXWMR]RXW X[[N\^U]\ X0 XYN[J]RXW\' BNJMN[\ J[N LJ^]RXWN]QJ] JWb 0X[`J[M&UXXTRWP RWR]RJ]R_N\ JWM]QN X^]LXVN X0 LXW]RWPNWLRN\ \^LQ J\ UR]RPJ]RXW JWM RW_N\]RPJ]RXW\' BNJMN[\ J[N LJ^]RXWN]QJ] JWb 0X[`J[M&UXXTRWP

CJ9FJ=9KC: H<97CAD5BMrG6IG=B9GG9G

82XZeR] FVR] 9deReV GVcg/TVd

VYkZghZan V[[ZXi*Wdi] eg^ci X^gXjaVi^dc VcY VYkZgi^h^c \ gZkZcjZh, : YkZgi^h^c \ *c eVgi^XjaVg*]Vh WZZc ^ b eVXiZY Wn adc \+iZg b higjXijgVa bdkZ bZcih ^c VYkZgi^h^c \ heZcY^c \ [gd b eg^ci id Y^\iVa, M]Z ^cXgZVh^c \ gVc \ Z d[VYkZgi^h^c \ X]d^XZh VcY [dg bVih]Vh gZhjaiZY ^c VjY^ZcXZ [gV \ bZciVi^dc VcY ^cXgZVhZY Xd b eZi^i^dc, MZX]cdad \^Zh VcY eda^X^Zh]VkZ Vahd WZZc VcY 1 ^aa Xdci^cjZ id WZ YZkZadeZY VcY ^ b eaZ bZciZY i]Vi bVn bV Z ^i bdgZ Y^[[^Xjai id iVg \Zi VcY bZVhjgZ i]Z Z[[ZXi^kZcZhh d[Y^\iVa VYkZgi^h^c \ dg Vaad 1 jhZgh id WadX ` VYkZgi^h^c \ dc 1 ZWh^iZh VcY bdW^aZ YZk^XZh* 1]^X] bVn ^ beVXi Y^\iVa VYkZgi^h^c \ gViZh dg gZkZcjZh, : h V bjai^+ eaVi[dg b cZ 1 h egdk^YZg* i]Z =d1 CdcZh hZ \ bZci gZXd \ c^oZh i]Z ^ bedgiVcXZ d[bVm^b^o^c \ gZkZcjZh [gd b V kVg^Zin d[bZY^V [dg bVih VcY eaVi[dg bh*Wdi] ^c iZg bh d[eV^Y XdciZci VcY ^c cZ 1 VYkZgi^h^c \ bdYZah* VcY Xdci^cjZh id ^ckZhi ^c ^ih Y^\iVa VcY di]Zg egdYjXih* 1]^X] gZegZhZci Vc ^cXgZVh^c \ an aVg \Zg h]VgZ d[gZkZcjZh Vi ^ih Xdchj bZg Wjh^cZhh, F dW^aZ YZk^XZh* i]Z^g gZaViZY Veeh VcY di]Zg iZX]cdad \^Zh* egdk^YZ Xdci^cjZY deedgijc^i^Zh [dg i]Z =d1 CdcZh hZ \ bZci id bV`Z ^ih XdciZci VkV^aVWaZ id V cZ 1 VjY^zcXZ d[gZVYZgh* ^cigdYjXZ cZ 1 dg Y^[[ZgZci eg^Xc \ hX]Z bZh VcY YZkZade ^ih egdYjXih id Xdci^cjZ id ViigVXi VYkZgi^hZgh VcY dg V[[ZXi i]Z gZaVi^dch]^e WZi 1Zzc XdciZci egdk^YZgh VcY Xdchj bZgh, M]Z =d1 CdcZh hZ \ bZci Xdci^cjZh id YzkZade VcY ^ beaZ bZci higVi2 \^Zh id Zmead^i ^ih XdciZci VXgdhh V kVg^Zin d[bZY^V X]VccZah VcY eaVi[dg bh* ^cXajY^c \ aZkZgV \^c \ ^ih XdciZci i]gd y] a^XZch^c \ VggVc \ZbZcih 1^i] i]^gY+eVgin Y^hig^Wji^dc eaVi[dg bh VcY \gd 1^c \ ^ih a^kZ_djgcVa^hb ZkZcih Wjh^cZhh,

HeZgVi^c \ ZmeZchZh [dg i]Z Xdch j bZg Wjh^cZhh ^cXa j YZ Xdhih gZaViZY id eVeZg* egdY jXi^dc* Y^hig^W ji^dc* i]^gY eVgin eg^ci^c * ZY^idg^Va VcY Xd b b^hh^dch, LZaa^c * \ZcZgVa VcY Vb ^c^higVi^kZ ZmeZchZh ^cXa j YZ egd b di^dcVa ZmeZchZh* hVaVg^Zh* Z b eadnZZ WZcZ[^ih* gZci VcY di]Zg gd ji^cZ dkZg]ZVYh, M]Z Xdhih VhhdX^ViZY 1^i] eg^ci^c \ VcY Y^hig^W ji^c \ cZ 1 heVeZgh* ^cXa j Y^c \ eVeZg eg^XZh VcY YZa^kZgn Xdhih* VgZ `Zn deZgVi^c \ ZmeZchZh 1]dhZ [a jXi jVi^dch XVc]VkZ V b ViZg^Va Z[[ZXi dc i]Z gZh jaih d[i]Z =d1 CdcZh hZ \ bZci-h Xdch j bZg Wjh^cZhh, M]Z Xdch j bZg Wjh^cZhh ^h V[[ZXiZY Wn i]Z XnXa^XVa ^cXgZVhZh VcY YZXgZVhZh ^c i]Z eg^XZ d[eVeZg VcY di]Zg [VXidgh i]Vi bVn V[[ZXi eVeZg eg^XZh* ^cXa jY^c * V bdc \ di]Zg i]^c \h* ^c[aVi^dc* h j eean X]V^c Y^hg jei^dch VcY iVg^{[[h dg di]Zg gZhig^Xi^dch dc cdc+N,L, eVeZg h j eea^Zgh, Bc VYY^i^dc* i]Z =d1 CdcZh hZ \ bZci gZa^Zh dc i]^gY eVgi^Zh [dg b jX] d[i]Z eg^ci^c \ VcY Y^hig^W ji^dc d[^ih eg^ci egdY jXih, Edc \+iZg b hig jXi jgVa bdkZ bZcih [gd b eg^ci id Y^\iva VcY X]Vc \c \ aVWdg b Vg`Zih egZhZci X]VaaZc \Zh id i]Z [^cVcX^Va VcY deZgVi^dcVa hiVW^a^in d[i]ZhZ i]^gY eVgi^Zh 1]^X] Xd jaY* ^c ijgc* ^b eVXi i]Z VkV^aVW^a^in* dg ^cXgZVhZ i]Z Xdhi* d[i]^gY eVgin eg^ci^c \ VcY Y^hig^W ji^dc hZgk^XZh [dg i]Z <db eVcn h c21 heVeZgh, F V_dg cZ1 i^iaZ gZaZVhZh gZegZhZci V h^\c^[^XVci edgi^dc d[i]Z ; dd` I jWa^h]^c\ hZ\ b Zci~h hVaZh i]gdj\]dji i]Z [^hXVa nZVg, Ig^ci+ WVhZY Xdchj b Zg Wdd`h VgZ \ZcZgVaan hdaY dc V [jaan gZijgcVWaZ WVh^h* gZhjai^c\ ^c i]Z gZijgc d[jchdaY Wdd`h, Bc i]Z Yd b Zhi^X VcY ^ciZgcVi^dcVa b Vg` Zih* i]Z ; dd` I jWa^h]^c\ hZ\ b Zci ^h hjW_ZXi id \adWVa igZcYh VcY adXVa ZXdcd b^X XdcY^i^dch* ^cXajYc\ gZXZci ^cXgZVhZh ^c ^c[aVi^dc VcY hjeean X]V^c Y^hgjei^dch* 1]^X] VgZ ZmeZXiZY id Xdci^cjZ id VYkZghZan V[[ZXi Xdhih ^c i]Z cZVg iZg b, HeZgVi^c\ ZmeZchZh [dg i]Z ; dd` I jWa^h]^c\ hZ\ b Zci ^cXajYZ Xdhih gZaViZY id eVeZg* eg^ci^c* [gZ^\]i* Vji]dgh~ gdnVai^Zh* ZY^idg^Va* egd b di^dcVa* Vgi VcY YZh^\c ZmeZchZh, LZaa^c * \ZcZgVa VcY VY b^c^higVi^kZ ZmeZchZh ^cXajYZ hVaVg^Zh* Z b eadnZZ WZcZ[^ih* gZci VcY di]Zg gdji^cZ dkZg]ZVY Xdhih,

BVhd AVUZR

KZkZcjZ Vi i]Z GZ1h FZY^V hZ\bZci ^h YZg^kZY eg^ bVg^an [gdb i]Z hVaZ d[VYkZgi^h^c*X^gXjaVi^dc VcY hjWhXg^ei^dch* Vh 1Zaa Vh a^XZch^c\, :YkZghZ X]Vc\Zh ^c \ZcZgVa bVg^Zi XdcY^i^dch [dg VYkZgi^h^c\]VkZ V[[ZXiZY* VcY bVn Xdci^cjZ id V[[ZXi* gZkZcjZh, :YkZgi^h^c\ gZkZcjZh Vi i]Z GZ1h FZY^V hZ\bZci VgZ Vahd hjW_ZXi id hZVhdcVa^in* 1^i] gZkZcjZh ine^XVaan WZ^c\]^\]Zhi ^c i]Z <d beVcn-h hZXdcY [^hXVa fjVgiZg YjZ id i]Z ZcY+d[+nZVg]da^YVn hZVhdc ^c ^ih bV^c deZgVi^c\ \Zd\gVe]^Zh, <^gXjaVi^dc VcY hjWhXg^ei^dc gZkZcjZh XVc WZ \gZVian V[[ZXiZY Wn X]Vc\Zh ^c i]Z eg^XZh d[i]Z <d beVcn-h VcY-dg Xd beZi^idgh~ egdYjXih* Vh 1Zaa Vh Wn egd bdi^dcVa VXi^k^iZh VcY cZ 1 h XnXaZh,

HeZgVi[^]c \ ZmeZchZh [^]cXaj YZ Xdhih gZaViZY id eVeZg^{*} egdY jXi[^]dc^{*} Y^hig[^]W ji[^]dc^{*} i][^]gY eVgin eg[^]ci[^]c \^{*}ZYⁱdg[^]Va^{*} Xd b b[^]hh[^]dch^{*} iZX] cdad \ n VcY gVY[^]d hedgih g[^]] ih, LZaa[^]c \^{*} \ZcZgVa VcY VY b[^]c[^]higVi[^]KZ ZmeZchZh [^]cXaj YZ egd b di[^]dcVa ZmeZchZh ^{*} NVg[^]Zh^{*} Z b eadnZZ WZcZ[[^]hh^{*} gZci VcY di]Zg gd ji[^]cZ dkZg]ZVY, M]Z Xdhi d[eVeZg [^]h V [^]Zn deZgVi[^]c \ ZmeZchZ 1]dhZ [ajXijVi[^]dch XVc]VkZ V b ViZg[^]Va Z[[ZXi dc i]Z gZh jaih d[i]Z hZ \ bZci, M]Z GZ 1 h F ZY[^]V hZ \ bZci Xdci[^]c jZh id WZ ZmedhZY id g[^]h h VhhdX[^]ViZY 1[^]i] eVeZg jhZY [dg eg[^]ci[^]c \, IVeZg [^]h V WVh[^]X Xd b b dY[^]in VcY [^]ih eg[^]XZ [^]h hZchⁱhKZ id i]Z WVaVcXZ d[hj eean VcY YZ b VcY, M]Z GZ 1 h F ZY[^]V hZ \ bZci⁻h ZmeZchZh VgZ V[[ZXiZY Wn i]Z XnXa[^]XVa [^]cXgZVhZh VcY YZXgZVhZh [^]c i]Z eg[^]XZ d[eVeZg VcY di]Zg [VXidgh i]Vi b Vn V[[ZXi eVeZg eg[^]XZh^{*} [^]cXaj Y[^]c \ V b dc \ di]Zg i][^]c \ h[^]c[aVi[^]dc^{*} h j eean X]V[^]c Y[^]hgj ei[^]dch VcY iVg[^][[h,

M]Z GZ1h FZY^V hZ\bZci~h egdYjXih XdbeZiZ [dg gZVYZgh]^e* VjY^ZcXZ VcY VYkZgi^h^c\ 1^i] adXVa VcY cVi^dcVa XdbeZi^idgh VcY

:2dTR],*,,

*CPTIRISINM NF = 07ERS

Bc CjcZ 0.00* i]Z <dbeVcn VXfj^gZY NeGZhi* BcX, &{NeGZhi | [dg Xadh^c \ XVh] Xdch^YZgVi^dc d[Veegdm^b ViZan "23 b^aa^dc* hjW_ZXi id Xjhid b Vgn ejgX]VhZ eg^XZ VY_jhi b Zcih* VcY je id "/3 b^aa^dc ^c [jijgZ XVh] Xdch^YZgVi^dc WVhZY jedc i]Z VX]^ZkZ b Zci d[XZgiV^c eZg[dg b VcXZ dW_ZXi^kZh dkZg i]Z cZmi i l d nZVgh, NeGZhi ^h V gZVa ZhiViZ V\Zci b Vg`ZieaVXZ i]Vi b ViX]Zh]db Z hZaaZgh VcY WjnZgh 1^i] ide adXVa V\Zcih 1]d Xd b eZiZ [dg i]Z^g Wjh^cZhh, M]Z NeGZhi VXfj^h^i^dc]Zaeh KZVaidg,Xd b " [jgi]Zg ZmeVcY ^ih hZgk^XZh VcY hjeedgi [dg]d b Z hZaaZgh VcY a^hi^c \ V\Zcih VcY Wgd`Zgh, NeGZhi ^h V hjWh^Y^Vgn d[F dkZ* VcY ^ih gZhjaih VgZ ^cXajYZY 1^i]^c i]Z =^\^iVa KZVa >hiViZ LZgk^XZh hZ \ b Zci,

*CPTIRISINM NF +ARE , HELICAKR

<EQL 5NAM * AMD : EUNKUIMG , QEDIS / ACIKISIER

 $\begin{array}{l} Hc \ F \ VgX \] \ 07^* \ 0.00^* \ i \] Z \ < db \ e \ Vcn \ iZg \ b^c \ ViZY \ ih \ Zm^hi^c \ j \ chZX \ j \ gZY \ "53. \ b^aa^dc \ gZk \ da^c \ XgZY^i \ [VX^a^in \ VcY \ ZciZgZY \ cid \ V \ cZ \ 1 \ XgZY^i \ V \ gZZ \ b \ Zci \ i \] \ Z \ (D \ < gZY^i \ V \ gZZ \ b \ Zci \ i \] \ Z \ (D \ < gZY^i \ V \ gZZ \ b \ Zci \ i \] \ Z \ (D \ < gZY^i \ V \ gZZ \ b \ Zci \ i \] \ Z \ (D \ < gZY^i \ V \ gZZ \ b \ Zci \ i \] \ Z \ (D \ < gZY^i \ V \ gZZ \ b \ Zci \ i \] \ Z \ (D \ (D \ < gZY^i \ V \ gZY^i \ V \ gZY^i \ V \ gZY^i \ [VX^a^in \ VcY \ ZciZgZY \ cid \ V \ CZ \ 1 \ XgZY^i \ V \ gZY \ ZgZY^i \ [VX^a^in \ VcY \ ZgZY^i \ [VX^a^in \ VcY \ ZgZY^i \ [VX^a^in \ VcY \ ZgZY^i \ [VX^a^in \ VgZ \ XgZY^i \ VX^a^in \ VgZ \ XgZY^i \ [VX^a^in \ VgZ \ XgZY^i \ VX^a^in \ VgZ \ XgZY^i \ [VX^a^in \ VgZ \ XgZY^i \ VX^a^in \ VgZ \ ZgZY^i \ XgZY^i \ VX^a^in \ VgZ \ ZgZY^i \ XgZY^i \ ZgZY^i \ XgZY^i \ VX^a^in \ VZY^a^in \ XgZ \ ZgZY^i \ ZgZY^i \ XgZY^i \ ZgZY^i \$

M]Z <d b eVcn ZciZgZY ^cid Vc ^ciZgZhi gViZ h l Ve YZg^kVi^kZ id [^m i]Z [adVi^c\ gViZ ^ciZgZhi Xd b edcZci d[^ih MZg b : EdVch Vi 0, .61 #, LZZ GdiZ // z ?^cVcX^Va Bchigj bZcih VcY ?V^g OVajZ FZVhjgZ bZcih ^c i]Z VXXd b eVcn^c\ <dchda^YViZY ?^cVcX^Va LiViZ bZcih,

 $M]Z < db eVcn Wdggd 1 ZY i]Z [jaa V b dj ci d[i]Z MZg b : ?VX^a^in dc F VgX] 1/* 0.00 VcY]VY cdi Wdggd 1 ZY Vcn [jcYh jcYZg i]Z KZkdak^c ?VX^a^in Vh d[CjcZ 1.* 0.00,$

*CPTIRISINM NF 892;

Bc ?ZWgjVgn 0.00* i]Z <dbeVcn VXfj^gZY i]Z H^a Ig^XZ Bc[dg b Vi^dc LZgk^XZ Wjh^cZhh VcY gZaViZY VhhZih &{HIBL|' [gd b L\$ I VcY

Xd b bZcX^{c} GdkZ b WZg /3^{*} 0.0/, M]Z cdiZh 1^{aa} b VijgZ dc F Vn /3^{*} 0.07, M]Z <d b eV cn jhZY i]Z cZi egdXZZYh [gd b i]Z d[[Zg^{c} [dg \ZcZgVa XdgedgViZ e jgedhZh^{*} 1]^{x}] ^{c} XajYZY VXf j^{h} i^{h} i^{h} i^{c} Xu^{h} i^{h} de i^{$^{h}}$ i^{$^{h}} i^{<math>^{h}$} i^{$^{h}}$ i^{$^{h}} i^{<math>^{h}}$ i^{$^{h}} i^{<math>^{h}$} i^{$^{h}}$ i^{$^{h}} i^{<math>^{h}$} i^{$^{h}}$ i^{$^{h}}$ i^{$^{h}}$ i^{$^{h}}</sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup>$ </sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup></sup>

ONNGKE OAQSMEQRHIO

Bc ?ZWgjVgn 0.0/* i]Z <d b eVcn ZciZgZY ^cid V b jai^+nZVg eVgicZgh]^e 1^i] @dd\aZ id egdk^YZ XdciZci [gd b ^ih cZ lh h^iZh VgdjcY i]Z ldgaY, M]Z i]gZZ+nZVg V\gZZ b Zci Vahd ^cXajYZh i]Z YZkZade b Zci d[V hjWhXg^ei^dc eaVi[dg b*i]Z h]Vg^c\ d[VYkZgi^h^c\ gZkZcjZ k^V @dd\aZ-h VYkZgi^h^c\ iZX]cdad\n hZgk^XZh*i]Z Xjai^kVi^dc d[VjY^d _djgcVa^hb VcY bZVc^c\[ja ^ckZhi b Zcih ^c k^YZd _djgcVa^hb Wn RdjMjWZ,

. KAQA

 $Bc = ZXZ b WZg 0.0.* i]Z < d b eVcn VXfj^gZY V Xdcigda^c \ciZgZhi ^c >aVgV MZX] cdad \ci I, & gZWgVcYZY K >: BcY^V i]gdj] V hjWhXg^ei^dc [dg cZ1 an+^hhjZY egZ[ZgZcXZ h]VgZh VcY i]Z Wjndji d[XZgiV^c b^cdg^in h]VgZ] daYZgh, M]Z idiVa V \gZ ViZ ejgX]VhZ eg^XZ VhhdX^ViZY 1^i] i]Z VXfj^h^i^dc Vi i]Z Xd b eaZi^dc YViZ ^h "/16 b^aa^dc 1]^X] eg^b Vg^an Xdch^hih d["47 b^aa^dc d[XVh]* i]Z [V^g kVajZ d[cdcXdcigdaa^c \ciZgZhih d["15 b^aa^dc VcY i]Z [V^g kVajZ d[i]Z <db eVcn-h egZk^djhan]ZaY Zfj^in ^ciZgZhi ^c K >: BcY^V d["00 b^aa^dc, : h V gZhjai d[i]Z igVchVXi^dch* K >: @gdje-h h]VgZ] daY^c \ciV c K >: BcY^V ^cXgZVhZY [gd b /1,3 # id 37,5 #* 1]^aZ GZ1 h <dgedgVi^dc-h h]VgZ] daY^c \ciV cXgZVhZY [gd b 00, / # id 17, . #, = jg^c \ i]Z i]gZZ b dci]h ZcYZY F VgX] 1/* 0.0/* K >: @gdje VXfj^gZY Vc VYY^i^dcVa .,6 # ^ciZgZhi ^c K >: BcY^V K >: @gdje VcY GZ1 h <dgedgVi^dc cd 1] daY Vaa K >: BcY^V WdVgY hZVih* VcY i]Z <db eVcn WZ \vc Xdchda^YVi^c \ K >: BcY^V ^c = ZXZ b WZg 0.0., M]Z VXfj^h^i^dc d[K >: BcY^V Vad 1 h K >: @gdje id WZ Vi i]Z [dgZ[gdci d[adc +iZg b \gd li] deedgijc^i^Zh 1^i]^c i]Z = ^\iV VcY i]Z Y^i^i^0Vi^dc d[i]Z gZVa ZhiViZ hZXidg, K >: BcY^V h V hjWh^Y^Vgn d[K >: @gdje* VcY ^ih gZhjaih VgZ ^cXajYZY 1^i]^c i]Z = ^\iV KZV a>hiViZ LZgk^XZh hZ bZci, : h V gZhjai d[i]Z igVchVXi^dch* i]Z <db eVcn-h d1 cZgh]^e ^c K >: @gdje 1 Vh YajiZY Wn .,0 # id 4/,2 #, LjWhZfjZci id CjcZ 1.* 0.0/* K >: @gdje egdk^YZY VYY^i^dcVa [jcY^c \ id K >: BcY^V ^c ZmX]VcZ [dg [jgi]Zg Zfj^in 1]^X] ^cXgZVhZY K >: @gdje-h d1 cZgh]^e ^ciZgZhi id 51,1 # VcY Y^ajiZY GZ1 h <dgedgVi^dc-h ^ciZgZhi id 04,4 #,$

* UAIK

Bc =ZXZ b WZg 0.0.* i]Z <d b eVcn VX fj^gZY KZciVaji^dch* BcX, &{ : kV^a | ' [dg ^c^i^Va XVh] Xdch^YZgVi^dc d[Veegdm^b ViZan "14 b^aa^dc* cZi d["2 b^aa^dc d[XVh] VX fj^gZY* VcY je id "6 b^aa^dc ^c [jijgZ XVh] Xdch^YZgVi^dc WVhZY jedc i]Z VX]^ZkZ b Zci d[XZgiV^c eZg[dg b VcXZ dW_ZXi^kZh dkZg i]Z cZmi i]gZZ nZVgh, : kV^a ^h V eaVi[dg b i]Vi ^b egdkZh i]Z gZci^c \ ZmeZg^ZcXZ [dg Yd+^i+ ndjghZa[aVcYadgYh VcY iZcVcih 1^i] dca^cZ iddah* ZYjXVi^dcVa XdciZci VcY 1 dgaY+XaVhh hjeedgi, M]Z VXfj^h^i^dc]Zaeh KZVaidg,Xd b ` [jgi]Zg ZmeVcY ^cid i]Z gZciVa heVXZ* ZmiZcY ^ih hjeedgi [dg aVcYadgYh* Vj \ bZci XjggZci gZciVa a^hi^c \ XdciZci* \gd 1 ^ih VjY^ZcXZ VcY Wj^aY WgVcY V[[^c^in VcY adc +iZgb gZaVi^dch]^eh 1^i] gZciZgh, : kV^a ^h V hjWh^Y^Vgn d[F dkZ* VcY ^ih gZhjaih VgZ ^cXaj YZY 1^i]^c i]Z =^\^iVa KZVa >hiViZ LZgk^XZh hZ \ bZci,

 $LZZ \ GdiZ \ 2 \ z \ : Xfj^h^i^dch^* = ^hedhVah \ VcY \ Hi]Zg \ MgVchVXi^dch \ ^c \ i]Z \ VXXd \ b \ eVcn^c \ \ < dchda^YViZY \ ?^cVcX^Va \ LiViZ \ b \ Zcih \ [dg \ [jgi]Zg \ Y^hXjhh^dc \ d[\ i]Z \ VXfj^h^i^dch \ VcY \ Y^hedh^i^dch \ Y^hXjhhZY \ VWdkZ,$

: ERTKSR NF 8 OEQASINMR [/IRCAK (&((UEQRTR / IRCAK (&('

 $\label{eq:main_state} M]Z \ [daad 1^c \ iVWaZ \ hZih \ [dgi] \ i]Z < db \ eVcn \ h \ deZgVi^c \ gZhjaih \ [dg \ [^hXVa \ 0.00 \ Vh \ Xd \ b \ eVgZY \ id \ [^hXVa \ 0.0/,$

:`c eYV \\ZdTR] j\\Rcd _U\\U >f_\ -*\\					
,*,,	,*,, ,*,+		'' 7 YR_XV		
		6 VeeVc)	K`cdV\$		
" 2*203	" 2*0.4	" 0/7	3 #		
/*60/	/*372	005	/2 #		
0*/.4	/*7.6	/76	/. #		
/*125	/*/31	/72	/5 #		
464	275	/67	16 #		
/.*163	7*136	/*.05	// #		
&3*/02'	&2*61/'	&071'	&4' #		
&1*370'	å1*032'	&116'	&/.'#		
&466'	&46.'	å6'	&/'#		
&/.7'	&/46'	37	13 #		
&/1'	&43'	30	6. #		
&77'	å31'	&24'	&65' #		
30	/21	&7/'	&42' #		
2+,	./*	-0,	2* ''		
&30'	&4/'	7	/3 #		
54.	167	15/	73 #		
	" 2*203 /*60/ 0*/.4 /*125 464 /.*163 &3*/02' &1*370' &466' &/.7' &/1' &77' 30 2+, &30'	,*,, ,*,+ " 2*203 " 2*0.4 /*60/ /*372 0*/.4 /*7.6 /*125 /*/31 464 275 /.*163 7*136 &3*/02' &2*61/' &1*370' &1*032' &466' &46.' &/.7' &/46' &/.7' &/46' &/1' &43' &77' &31' 30 /21 2+, ./* &30' &4/'	,*,, ,*,+ $7YR_XV$ $6VeeVc)$ " $2^{2}203$ " $2^{4}0.4$ " $0/7$ $/^{8}60/$ /*372 005 $0^{*}/.4$ /*7.6 /76 $/^{*}125$ /*/31 /72 464 275 /67 $/.*163$ 7*136 /*.05 $\&3^{*}/02'$ $\&2^{*}61/'$ $\&071'$ $\&1^{*}370'$ $\&1^{*}032'$ $\&116'$ $\&466'$ $\&46.'$ $\&6'$ $\&1/.7'$ $\&/46'$ 37 $\&1/1'$ $\&43'$ 30 $\&777'$ $\&31'$ $\&24'$ 30 /21 $\&7/'$ $\&30'$ $\&44''$ 7		

 $VcY i]Z edh^i^kZ^b eVXi d[[dgZ^cX_i]ggZcX_n [ajXijVi^dch^* eVgi^Vaan d[[hZi Wn]^]Zg hedgih VcY ZciZgiV^c bZci egd_gV b b^c g^] ih Xdhih YjZ id ^cXgZVhZY XdciZci VkV^aVW^a^in, M]Z^b eVXi d[[dgZ^c XjggZcX_n [ajXijVi^dch d[i]Z N,L, YdaaVg V\V^chi adXVa XjggZcX^Zh gZhjaiZY ^c Vc HeZgVi^c ZmeZchZ YZXgZVhZ d["54 b^aa^dc* dg 0#* [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00 Vh Xd b eVgZY id [^hXVa 0.0/,$

; EKKIMG\$ GEMEQAK AMD AD LIMIR\$QASIUE z LZaa^Ac * \ZcZgVa VcY VY b^Ac^AhigVi^AkZ ^AcXgZVhZY "116 b^Aa^Adc* dg / . #* [dg i]Z [^AhXVa nZVg ZcYZY Cj cZ 1.* 0.00 Vh Xd b eVgZY id [^AhXVa 0.0/, M]Z ^AcXgZVhZ ^Ac LZaa^Ac * \ZcZgVa VcY VY b^Ac^AhigVi^AkZ [dg i]Z [^AhXVa nZVg ZcYZY Cj cZ 1.* 0.00 I Vh eg^A b Vg^Aan YjZ id ^ACXgZVhZY ZmeZchZh Vi i]Z = \^iVa KZVa >hiViZ LZgk^AXZh hZ \ b Zci Yg^AkZc Wn i]Z VXf j^AhⁱAch d[F dgi \V\Z <] d^AXZ VcY K> : BcY^{V*}]^A]Zg Z b eadnZZ Xdhih Vi Wdi] F dkZ VcY K> : @gd je VcY ^ACXgZVhZY b Vg ^SZi^Ac \ ZmeZchZh Vi F dkZ, M]Z ^ACXgZVhZ 1 Vh Vahd Yg^AkZc Wn]^A]Zg Xdhih Vi i]Z = d1 CdcZh hZ \ bZci YjZ id i]Z ^b eVXi d[gZXZci VXf j^AhⁱAch^{*} cXaj Y^c \ V "03 b^Aaa^Adc ^b eVXi [gd b HIBL VcY < F : +gZaViZY igVchVXi^Adc Xdhih^{*} cXgZVhZY Z b eadnZZ Xdhih VcY ^b y^SZi^Ac \ Xdhih, M]Z ^ACXgZVhZ 1 Vh eVgⁱVaan d[[hZi Wn ad 1 Zg Xdhih d["45 b^Aaa^Adc ^c i]Z Hi]Zg hZ \ bZci^{*} eg^A b Vg^Aan Yg^AkZc Wn ad 1 Zg Zf j^Ain+ WVhZY Xd b eZchVi^Adc Xdhih aVg \Zan gZaViZY id hidX` eg^AXZ eZg[dg b VcXZ VcY ad 1 Zg dcZ+i^A b Z aZ \Va hZiiaZ b zci Xdhih, M]Z ^b eVXi d[[dgZ^A c X jggZcXn [ajXijVi^Ach d[i]Z N,L, YdaaVg V \V^Achi adXVa X jggZcX^AZh gZh jaiZY ^c V LZaa^Ac * \ZcZgVa VcY VY b^Ac^AhigVi^AkZ YZXgZVhZ d["4/ b^Aa^Adc^{*} dg 0 #* [dg i]Z [^AhXVa nZVg ZcYZY Cj cZ 1.* 0.00 Vh Xd b eVgZY id [^AhXVa 0.0/,

- EOQECIASINM AMD A L NQSIYASINM z =ZegZX[\]Vi[\]dc VcY V b dgi[\]oVi[\]dc ZmeZchZ [\]CXgZVhZY "6 b[\]aa[\]dc[\]dc dg / #* [dg i]Z [[\]hXVa nZVg ZcYZY Cj cZ 1.* 0.00 W Xd b eVgZY id [[\]hXVa 0.0/, ?dg i]Z [[\]hXVa nZVg ZcYZY Cj cZ 1.* 0.00^{*} "06 b[\]aa[\]dc dg]]] Zg V b dgi[\]oVi[\]dc ZmeZchZ [gd b[\]ci[\]Vc[\]WaZ VhhZih Yg[\]kZc Wn i]Z <db eVcn^{\+}h gZXZci VXf j[\]h^{*}i[\]dch 1 Vh eVgi[\]Vaan d[[hZi Wn "0. b[\]aa[\]dc d[ad 1 Zg YZegZX[\]Vi[\]dc ZmeZchZ Yg[\]kZc Wn i]Z igVch^{*}i^{*}dc id Y[\]i^{*}Va VcY dei^{*}b^{*}OVi^{*}dc d[i]Z <db eVcn^{\+}h eg^{*}ci^{*}c \ deZgVi^{*}dch, M]Z ^{*}b eVXi d[[dgZ[\]c XjggZcXn [aj Xij Vi^{*}dch d[i]Z N,L, YdaaVg V^{*}chi adXVa XjggZcX²Zh gZh jaiZY ^{*}c V YZegZX^{*}Vi^{*}dc VcY V b dgi^{*}OVi^{*}dc ZmeZchZ YZXgZVhZ d["/1 b^{*}aa^{*}dc^{*} dg 0 #* [dg i]Z [^{*}hXVa nZVg ZcYZY Cj cZ 1.* 0.00 Vh Xd b eVgZY id [^{*}hXVa 0.0/,

 $= jg^{c} \langle i]Z [^{hXVa} nZVg ZcYZY CjcZ 1.* 0.00^{*}i]Z \langle dbeVcn gZXd \langle c^{o}ZY cdc+XVh]^{beVa}g ZciX]Vg \langle Zh d["/3 b^{aa^{d}c} gZaViZY idi]Z l g^{i}Z+Yd l c d[[^{mZY} VhhZih VhhdX^{ViZY} 1^{i}]i]Z h]jiYd l c VcY Vci^{A^{e}ViZY} hVaZ d[XZgiV^{c} N,L, eg^{ci^{c}} \langle VX^{a^{i}^{A}Zh} Vii]Z = d l CdcZh hZ \langle bZci,$

 $LZZ \ GdiZ \ 3 \ z \ KZhig j Xi j g^c \setminus Igd gV bh \ VcY \ GdiZ \ 5 \ z \ IgdeZgin^* \ IaVci \ VcY > f j^e b Zci \ ^c i]Z \ VXXd \ b e Vcn^c \setminus < dchda^YViZY \ ?^c VcX^Va \ LiViZ \ b Zcih,$

 $. PTISX KNRRER NF AFFIKIASER z > f j^in adhhZh d[V[[^a^ViZh YZXgZVhZY Wn "30 b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00 Vh Xd b eVgZY id [^hXVa 0.0/* eg^b Vg^an YjZ id i]Z WhZcXZ d[i]Z "32 b^aa^dc cdc+XVh] 1 g^iZ+Yd 1 c d[i]Z ?dmiZa @gdje~h ^ckZhi bZci ^c i]Z G^X `ZadYZdc : jhigVa^V Cd^ci OZcijgZ ^c i]Z [djgi] fjVgiZg d[[^hXVa 0.0/, LZZ GdiZ 4 z BckZhi bZcih ^c i]Z VXXd b eVcn^c \ <dchda^YViZY ?^cVcX^Va LiViZbZcih,$

 $2MSEQERS \ EWOEMRES \ MeS \ z \ BciZgZhi \ ZmeZchZ* \ czi \ [dg \ i]Z \ [^hXVa \ nZVg \ ZcYZY \ CjcZ \ 1.* \ 0.00 \ ^cXgZVhZY \ "24 \ b^aa^dc \ Vh \ Xd \ b \ eVgZY \ id \ [^hXVa \ 0.0/* \ eg^b \ Vg^an \ Yg^kZc \ Wn \ i]Z \ ^hhjVcXZ \ d[\ i]Z \ 0.0/ \ VcY \ 0.00 \ LZc^dg \ GdiZh \ ^c \ : eg^a \ 0.0/ \ VcY \ ?ZWgjVgn \ 0.00* \ gZheZXi^kZan* \ VcY \ i]Z \ ^cXjggZcXZ \ d[\ i]Z \ MZg \ b \ : \ EdVch \ ^c \ FVgX] \ 0.00, \ LZZ \ GdiZ \ 7 \ z \ ; dggd \ l^c \ h^c \ i]Z \ VXXd \ b \ eVcn^c \ < dchda^YViZY \ ?^cVcX^Va \ LiViZ \ bZcih,$

8 SHEQ\$ ME\$ z Hi]Zg* cZi YZXgZVhZY "7/ b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00 Vh Xd b eVgZY id [^hXVa 0.0/, LZZ GdiZ 0/ z : YY^i^dcVa ?^cVcX^Va Bc[dg b Vi^dc ^c i]Z VXXd b eVcn^c \ <dchda^YViZY ?^cVcX^Va LiViZ b Zcih,

2MCNLE SAW EWOEMRE z M]Z <d b eVcn~h ^cXd b Z iVm ZmeZchZ VcY Z[[ZXi^kZ iVm gViZ [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00 1 ZgZ "30 b^aa^dc VcY 4 #* gZheZXi^kZan* Vh Xd b eVgZY id Vc ^cXd b Z iVm ZmeZchZ VcY Z[[ZXi^kZ iVm gViZ d["4/ b^aa^dc VcY /2 #* gZheZXi^kZan* [dg [^hXVa 0.0/,

?dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00* i]Z <d b eV cn gZXdgYZY ^cXd b Z iVm ZmeZchZ d["30 b ^aa^dc dc egZ+iVm XVa nZVZ G^X`ZadYZ

Vaad 1 VcXZh WZ^c \ gZXdgYZY V \V^chi iVm WZcZ[^ih ^c XZgiV^c [dgZ^\c _jg^hY^Xi^dch 1^i] deZgVi^c \ adhhZh VcY Wn i]Z ^b eVXi d[[dgZ^\c deZgVi^dch 1]^X] VgZ hjW_ZXi id]^]Zg iVm gViZh* d[[hZi Wn V gZaZVhZ d[kVajVi^dc Vaad 1 VcXZh d["42 b^aa^dc gZaViZY id XZgiV^c N,L, YZ[ZggZY iVm VhhZih i]Vi VgZ b dgZ a^ Zan i]Vc cdi id WZ gZVa^oZY VcY i]Z gZ b ZVhj gZ b Zci d[YZ[ZggZY iVmZh ^c i]Z N,D,

 $F VcV \ Z b Zci VhhZhhZh VkV^aVWaZ Zk^YZcXZ id YZiZg b^cZ 1]Zi]Zg hj [[^XA^Zci [jijgZ iVmVWaZ ^cXd bZ 1 ^aa WZ \ ZcZgViZY id eZg b^i i]Z jhZ d[Zm^hi^c \ YZ[ZggZY iVm VhhZih, ; VhZY dc b VcV \ Z b Zci^h VhhZhh b Zci d[VkV^aVWaZ Zk^YZcXZ* ^i]Vh WZZc YZiZg b^cZY i]Vi ^i ^h b dgZ a^ Zan i] Vc cdi i] Vi YZ[ZggZY iVm VhhZih ^c XZgiV^c [dgZ^c _jg^hY^Xi^dch b Vn cdi WZ gZVa^oZY VcY i]ZgZ[dgZ* V kVajVi^dc Vaad 1 VcXZ]Vh WZZc ZhiVWa^h]ZY V \ Vchi i]dhZ iVm VhAZih,$

 $7ES IMCNLE z GZi ^cXd bZ 1 Vh "54. b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.00* Vh Xd beVgZY id "167 b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.0/* Vc ^b egdkZ bZci d["15/ b^aa^dc* dg 73 #* eg^b Vg^an Yg^kZc Wn]^]Zg MdiVa LZ\ bZci >; BM = :* ad 1Zg ^b eV^g bZci VcY gZhigjXijg^c X]Vg Zh VcY ad 1Zg adhhZh [gd b Zfj^in V[[^a^ViZh* eVgi^Vaan d[[hZi Wn ad 1Zg Hi]Zg* cZi VcY]^]Zg ^ciZgZhi ZmeZchZ,$

7 ES IMCNLE ASSQIBTSABKE SN MNMCNMSQNKKIMG IMSEQERSR z GZi ^cXd b Z Viig^WjiVWaZ id cdcXdcigdaa[^]c \ ^ciZgZhih 1 Vh "/15 b^aa[^]dc [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00* Vh Xd b eVgZY id cZi ^cXd b Z Viig[^]WjiVWaZ id cdcXdcigdaa[^]c \ ^ciZgZhih d["37 b^aa[^]dc [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.0/* eg[^]b Vg[^]an Yg[^]kZc Wn ^cXgZVhZY ZVgc[^]c \ h Vi K>: @gdje^{*} 1]^X] ^cXajYZY i]Z "/.5 b^aa[^]dc \V^c [gd b i]Z Y^hedh[^]i[^]dc d[[^]hZc[^]Ar V^c [gd b i]Z Y^hedh[^]Ar V^c [gd b i]Z Y^hedh[^]dc d[[^]hZc[^]Ar V^c [gd b i]Z Y^hedh[^]Ar V^c [gd b[^]Ar V^c [gd b[^]

; EGLEMS * MAKXRIR

 $LZ \ bZci > ; BM = : \ ^h YZ[^cZY \ ^h gZkZcjZh \ ^aZhh \ ^dZgVi^c \ ^ZmeZchZh \ ^cY \ ^bZa^c \ ^k \ ^ZcZgVa \ ^cY \ ^b \ ^chigVi^kZ \ ^ZmeZchZh, \ ^LZ \ ^bZci > ; BM = : \ ^dZh \ ^cXaj \ ^ZgZX^Vi^dc \ ^cY \ ^b \ ^dgi^oVi^dc \ ^b \ ^b \ ^b \ ^b \ ^b \ ^cY \ ^gZhigjXijg^c \ X] \ ^gZh^* \ ^Zfj^in \ ^adhZh \ ^d[\ ^[(^a^ViZh^* \ ^cXdb \ ^cX$

 $LZ \ bZci > ; BM = : \ ^h i]Z \ eg^b \ Vgn \ bZvhjgZ \ jhZY \ Wn \ i]Z \ <db \ eVcn^h \ X]^Z[\ deZg \ Vi^c \ YZX^h^dc \ bV^Zg \ id \ ZkVaj \ ViZ \ i]Z \ eZg[dg \ bVcXZ \ d[* VcY \ VaadXViZ \ gZhdjg \ XZh \ 1^i]^c^* \ i]Z \ <db \ eVcn^h \ Wjh^cZhhZh, \ LZ \ bZci > ; BM = : \ egd \ ^YZh \ bVcV \ Zb \ Zci^* \ ^ckZhidgh \ VcY \ Zf \ j^in \ VcVanhih \ 1^i] \ V \ bZvhjgZ \ id \ VcVanoZ \ i]Z \ deZg \ Vi^c \ eZg[dg \ bVcXZ \ d[\ ZVX] \ d[\ i]Z \ <db \ eVcn^h \ Wjh^cZhh \ hZ \ bVcV \ Zb \ Zci^* \ ^ckZhidgh \ VcY \ Zf \ j^in \ VcVanhih \ 1^i] \ V \ bZvhjgZ \ id \ VcVanoZ \ i]Z \ deZg \ Vi^c \ eZg[dg \ bVcXZ \ d[\ ZVX] \ d[\ i]Z \ <db \ eVcn^h \ Wjh^cZhh \ hZ \ bZcih \ VcV \ Ab \ ZcihVcV \ Ab \ Zci^* \ Ab \ ZvhZ \ Ab \ ZvLZ \ Ab \ ZvhZ \ Ab \ ZvhZ \ Ab \ ZvLZ \ ZvLZ \ Ab \ ZvLZ \ ZvLZ \ Ab \ ZvLZ \ Ab \ ZvLZ \ ZvLZ \ ZvLZ \ Ab \ ZvLZ \ ZvLZ \ ZvLZ \ ZvLZ \ Ab \ ZvLZ \ ZvLZ$

MdiVa LZ\ bZci >; BM =: ^h V cdc+@ :: I bZVhjgZ VcY h]djaY WZ Xdch^YZgZY ^c VYY^i^dc id* cdi Vh V hjWhi^ijiZ [dg* cZi ^cXd bZ &adhh'* XVh] [ad 1 VcY di]Zg bZVhjgZh d[[^cVcX^Va eZg[dg bVcXZ gZedgiZY ^c VXXdgYVcXZ 1^i] @ :: I, Bc VYY^i^dc*i]^h bZVhjgZ YdZh cdi gZ[aZXi XVh] VkV^aVWaZ id [jcY gZfj^gZbZcih VcY ZmXajYZh ^iZ bh* hjX] Vh YZegZX^Vi^dc VcY V bdgi^oVi^dc VcY ^b eV^g bZci VcY gZhigjXijg^c X]Vg\Zh* 1]^X] VgZ h^\c^[^XVci Xd bedcZcih ^c VhhZhh^c\ i]Z <d beVcn~h [^cVcX^Va eZg[dg bVcXZ, M]Z <d beVcn WZa^ZkZh i]Vi i]Z egZhZciVi^dc d[MdiVa LZ\ bZci >; BM = : egdk^YZh jhZ[ja ^c[dg bVi^dc gZ\VgY^c\ i]Z <d beVcn~h deZgVi^dch VcY di]Zg [VXidgh i]Vi V[[ZXi i]Z <d beVcn~h gZedgiZY gZhjaih, LeZX^[^XVaan* i]Z <d beVcn WZa^ZkZh i]Vi Wn ZmXajY^c \ XZgiV^c dcZ+i^bZ dg cdc+XVh] ^iZ bh hjX] Vh ^b eV^g bZci VcY gZhigjXijg^c \ X]Vg\Zh VcY YZegZX^Vi^dc VcY V bdgi^oVi^dc* Vh 1Zaa Vh ediZci^Va Y^hidgi^dch WZi 1Zzc eZg^dYh XVjhZY Wn [VXidgh hjX] Vh [^cVcX^c \ VcY XVe^iVa higjXijgZh VcY X]Vc\Zh ^c iVm edh^i^dch dg gZ\^bZh* i]Z <d beVcn egdk^YZh jhZgh d[^ih Xdchda^YViZY [^cVcX^Va hiViZbZcih 1^i] ^ch^]i ^cid Wdi] ^ih XdgZ deZgVi^dch Vh 1Zaa Vh i]Z [VXidgh i]Vi V[[ZXi gZedgiZY gZhjaih WZi 1Zzc eZg^dYh Wji 1]^X] i]Z <d beVcn WZa^ZkZh VgZ cdi gZegZhZciVi^kZ d[^ih XdgZ Wjh^cZhh, :h V gZhjai* jhZgh d[i]Z <d beVcn *Ka^Na hiViZ bZcih VgZ WZiiZg VWaZ id ZkVajViZ X]Vc\Zh ^c i]Z XdgZ deZgVi^c \ gZhjaih d[i]Z <d beVcn VXgdhh Y^[[ZgZci eZg^dYh,

$M]Z [daad 1^c iWaZ gZXdcX^aZh GZi^cXd bZ id MdiVa LZ bZci >; BM = : [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00 VcY 0.0/8]$

		_UVU		
	,*,,		;	,*,+
#Z_ ^ Z]]Z`_ d \$				
GZi ^cXd bZ	"	54.	"	167
: YY8				
BcXd b Z iVm ZmeZchZ		30		4/
Hi]Zg* cZi		&30'		&/21'
BciZgZhi ZmeZchZ* cZi		77		31
>fj^in adhhZh d[V[[^a^ViZh		/1		43
B b eV^g b Zci VcY gZhig j Xi j g^c \ X] Vg \Zh		/.7		/46
=ZegZX^Vi^dc VcY Vbdgi^oVi^dc		466		46.
H`eR] GVX ^ V_e 96=H85	!	+&003	!	+&,1-

 $M]Z [daad 1^c \ iVWaZ hZih [dgi] i]Z < db eVcn~h KZkZc jZh VcY LZ \ bZci > ; BM = : Wn gZedgiVWaZ hZ \ bZci [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00 VcY 0.0/8]$

	,*	۴,,	,*	,+	
#Z_ ^Z]]Z`_d\$	FVgV_fVd	GVX ^ V_e 9 6=H 8 5	FVgV_fVd	GVX ^ V_e 9 6=H8 5	
=^\^iVa KZVa >hiViZ LZgk^XZh	" /*52/	" 352	" /*171	" 3/2	
LjWhXg^ei^dc O^YZd LZgk^XZh	0*.04	14.	0*.50	137	
=dl CdcZh	0*2	211	/*5.0	110	
; dd` IjWa^h]^c \	0*/7/	1.4	/*763	1.1	
GZ1h FZY ^A V	0*201	0/5	0*0.3	30	
Hi]Zg	Z	&00/'	/	&065'	
H`eR]	! +*&-2/	! +&003	! 3&-/2	! +&,1-	

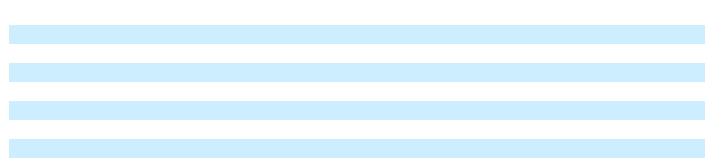
- IGISAK : EAK . RSASE ; EQUICER #/5 # VcY /3 # d[i]Z < d b eVcn~h Xdchda^YViZY gZkZcjZh ^c [^hXVa 0.00 VcY 0.0/* gZheZXi^kZan'

	:`c eYV \\ZdTR] jVRcd V_							
		,*,,			7	YR_XV	'' 7 YR_XV	
#Z_ ^Z]]Z`_d& ViTVae '' \$						6 VeeVc)#K	`cdV\$	
KZkZcjZh8								
<^gXjaVi^dc VcY hjWhXg^ei^dc	"	/1	"	03	"	&/0'	å26' #	
: YkZgi^h^c \		/13		/04		7	5 #	
KZVa ZhiViZ		/*125		/*/31		/72	/5 #	
Hi]Zg		024		67		/35	((
H`eR] FVgV_fVd		+&1.+		+&-3-		2	,/ "	
HeZgVi^c \ ZmeZchZh		&O.6'		&/60'		&04'	&/2'#	
LZaa^c * \ZcZgVa VcY VY b ^c^higVi^kZ		&737'		&475'		å040'	&16' #	
GVX ^ V_e 96=H85	!	/1.	!	/+.	!	0*	+, "	

((cdi bZVc^c[ja

?dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.*0.00* gZkZc jZh Vi i]Z =^\^iVa KZVa >hiViZ LZgk^XZh hZ\ bZci ^cXgZVhZY "126 b^aa^dc* dg 03 #* Vh Xd b eVgZY id [^hXVa 0.0/, : i K>: @gd je* gZkZc jZh ^cXgZVhZY "055 b^aa^dc* dg 15 #* id "/*.07 b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.*0.00 [gd b "530 b^aa^dc ^c [^hXVa 0.0/* eg^ b Vg^an Y jZ id i]Z "/21 b^aa^dc Xdcig^W ji^dc [gd b i]Z VXf j^h^i^dc d[F dgi \V\Z <]d^XZ ^c i]Z [djgi] f jVgiZg d[[^hXVa 0.0/* vc ^cXgZVhZ ^c : jhigVa^Vc YZei] gZkZc jZ Yg^kZc Wn]^\]Zg cVi^dcVa a^hi^c \h VcY eg^XZ ^cXgZVhZh VcY Vc "/6 b^aa^dc ^cXgZVhZ [gd b i]Z VXf j^h^i^dc d[K> : BcY^V ^c i]Z hZXdcY f jVgiZg d[[^hXVa 0.0/* eVgi^Vaan d[[hZi Wn i]Z "07 b^aa^dc cZ \Vi^kZ ^ b eVXi d[[dgZ^\c XjggZcXn [ajXijVi^dch VcY i]Z "00 b^aa^dc VYkZghZ ^ b eVXi [gd b V kVajVi^dc VY_jhi bZci gZaViZY id ZmeZXiZY igVaa Xd b b^hh^dch Vi ^hi [^cVcX^Va hZgk^XZh Wjh^cZhh, KZkZc jZh Vi F dkZ ^cXgZVhZY "5/ b^aa^dc* dg // #* id "5/0 b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00 [gd b "42/ b^aa^dc ^c [^hXVa 0.0/* eg^ b Vg^an Yg^kZc Wn]^\]Zg gZVa ZhiViZ gZkZcjZh, M]Z igVY^i^dcVa aZVY \ZcZgVi^dc egdYjXi WZcZ[^iZY [gd b]^\]Zg Xdcig^Wji^dc [gd b F Vg`Zi OBI^{LF}* V]nWg^Y egdYjXi d[[Zg^c* ^c VYY^i^dc id ^cXgZVhZY n^ZaY [gd b <dccZXi^dch^{LF} Iajh* eVgi^Vaan d[[hZi Wn ad 1 Zg aZVY kdaj bZ, M]Z gZ[ZggVa b dYZa WZcZ[^iZY [gd b





3 R[L^UJ]RXW JWM \^K\L[RY]RXW [N_NW^N\

	:`c eYV WZdTR] jVRcd V_UVU >f_V -*&						
	,*,,		,*,+		,*,+ 7YR_XV		'' 7 YR_XV
#1_ ^ 2]]2`_dk V i TVae '' \$						6 VeeVc)# I	K`cdV\$
<^gXjaVi^dc VcY hjWhXg^ei^dc gZkZcjZh8							
<^gXjaVi^dc VcY di]Zg	"	715	"	6/5	"	/0.	/3 #
Igd[Zhh^dcVa ^c[dg b Vi^dc Wjh^cZhh		357		257		/	0/ #
H`eR] TZcTf]ReZ`_ R_U dfSdTcZaeZ`_ cVgV_fVd	!	+&/+0	!	+&,30	!	,,*	+1 "

<^gXjaVi^dc VcY hjWhXg^ei^dc gZkZcjZh ^cXgZVhZY "00. b ^aa^dc

CNPVNW] 529D41

?dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.00* LZ bZci >; BM = : Vi i]Z = d1 CdcZh hZ bZci ^cXgZVhZY ''. / b^aa^dc* dg 1. #* Vh Xd b eVgZY id [^hXVa 0.0/* ^cXajY^c i]Z ''/7 b^aa^dc VcY ''/5 b^aa^dc ^b eVXih [gd b i]Z VXf j^h^i^dch d[B ; = VcY HIBL* gZheZXi^kZan* eg^b Vg^an YjZ id i]Z ^cXgZVhZ ^c gZkZc jZh Y^hX jhhZY VWdkZ* eVgi^Vaan d[[hZi Wn ^cXgZVhZY Z b eadnZZ Xdhih* i]Z ''03 b^aa^dc ^b eVXi [gd b HIBL VcY < F : +gZaViZY igVchVXi^dc Xdhih VcY ^cXgZVhZY hVaZh VcY b Vg `Zi^c \ Xdhih,

+*NNJ 9TBURHIMG* &O/# d[i]Z <dbeVcn~h Xdchda^YViZY gZkZcjZh ^c Wdi] [^hXVa 0.00 VcY 0.0/'

²Zn bVhi]ZVYh* eg^ci VYkZgi^h/c\ \gd1i] Vi GZ1h ND* i]Z edh^i^kZ ^b eVXi d[i]Z 31gY 1ZZ` VcY]^\]Zg gZkZcjZh Vi P^gZaZhh @gdje* eVgi^Vaan d[[hZi Wn i]Z cZ\Vi^kZ ^b eVXi d[[dgZ^\c XjggZcXn [ajXijVi^dch, <^gXjaVi^dc VcY hjWhXg^ei^dc gZkZcjZh ^cXgZVhZY "61 b^aa^dc Vh Xd b eVgZY id [^hXVa 0.0/* Yg^kZc Wn]^\]Zg XdciZci a^XZch^c\ gZkZcjZh* eg^b Vg^an Vi GZ1h <dge : jhigVa^V* Y^\iVa hjWhXg^WZg \gd1i] VXgdhh `Zn bVhi]ZVYh* XdkZg eg^XZ ^cXgZVhZh VcY i]Z edh^i^kZ ^b eVXi d[i]Z 31gY 1ZZ` * eVgi^Vaan d[[hZi Wn eg^ci kdaj bZ YZXa^cZh VcY i]Z cZ\Vi^kZ ^b eVXi d[[dgZ^\c XjggZcXn [ajXijVi^dch, Hi]Zg gZkZcjZh [dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.00 ^cXgZVhZY "/3 b^aa^dc Vh Xd b eVgZY id [^hXVa 0.0/* eg^b bVg^an Yg^kZc Wn ^cXgZVhZY gZkZcjZh Vi GZ1h <dge : jhigVa^V* eVgi^Vaan d[[hZi Wn ad 1Zg gZkZcjZ h Vi GZ 1h ND, M]Z ^b eVXi d[[dgZ^\c XjggZcXn [ajXijVi^dch d[i]Z N,L, YdaaVg V\V^chi adXVa XjggZcX^Zh gZhjaiZY ^c V gZkZcjZ YZXgZVhZ d["25 b^aa^dc* dg 0#* [dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.00 Vh Xd b eVgZY id [^hXVa 0.0/, M]Z ^b eVXi d[i]Z 31gY 1ZZ` ^c [^hXVa 0.00 gZhjaiZY ^c V gZkZcjZ ^cXgZVhZ d[Veegdm^b ViZan "14 b^aa^dc,

?dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00* LZ\ bZci >; BM = : Vi i]Z GZ1h FZY^V hZ\ bZci ^ begdkZY Wn "/43 b^aa^dc Vh Xd beVgZY id [^hXVa 0.0/* eg^b Vg^an YjZ id]^\]Zg Xdcig^Wji^dch [gd b GZ1h <dge : jhigVa^V d["/.7 b^aa^dc VcY GZ1h ND d["32 b^aa^dc b V^can Yg^kZc Wn i]Z]^\]Zg gZkZc jZh YZhXg^WZY VWdkZ* Vh 1Zaa Vh ^cXgZVhZY Xdcig^Wji^dch d["/6 b^aa^dc VcY "/4 b^aa^dc [gd b P^gZaZhh @gd je VcY i]Z >N ` IX[T @X]* gZheZXi^kZan* eVgi^Vaan d[[hZi Wn ^cXgZVhZY Xdcig^Wji^dch VhdX^ViZY 1^i] MVa`MO,

>N`\ 3X[Y 1^\][JURJ

KZkZcjZh 1ZgZ "/*.66 b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00* Vc ^cXgZVhZ d["7/ b^aa^dc* dg 7 #* Vh Xd b eVgZY id [^hXVa 0.0/ gZkZcjZh d["775 b^aa^dc, <^gXjaVi^dc VcY hjWhXg^ei^dc gZkZcjZh ^cXgZVhZY "22 b^aa^dc* eg^ b Vg^an Yg^kZc Wn]^]Zg XdciZci a^XZch^c gZkZcjZh *Y^\^iVa hjWhXg^WZg \gd 1 i] VcY i]Z edh^i^kZ ^ b eVXi d[i]Z 31gY 1ZZ * eVgi^Vaan d[[hZi Wn i]Z "/2 b^aa^dc cZ\Vi^kZ ^ b eVXi d[[dgZ^\c XjggZcXn [ajXijVi^dch VcY eg^ci kdaj b Z YZXa^cZh, : YkZgi^h^c \ gZkZcjZh ^cXgZVhZY "0/ b^aa^dc* eg^ b Vg^an YjZ id]^\]Zg Y^\iVa VYkZgi^h^c \ gZkZcjZh Yg^kZc Wn]^\]Zg ^ b egZhh^dch VcY i]Z edh^i^kZ ^ b eVXi d[i]Z 31gY 1ZZ * eVgi^Vaan d[[hZi Wn i]Z "/2 b^aa^dc cZ\Vi^kZ * eVgi^Vaan d[[hZi Wn i]Z "/2 b^aa^dc cZ\Vi^kZ ^ b eVXi d[]dgZ^\c XjggZcXn [ajXijVi^dch, VcY i]Z edh^i^kZ ^ b eVXi d[i]Z 31gY 1ZZ * eVgi^Vaan d[[hZi Wn i]Z "/2 b^aa^dc cZ\Vi^kZ ^ b eVXi d[[dgZ^\c XjggZcXn [ajXijVi^dch, Hi]Zg gZkZcjZh ^cXgZVhZY "04 b^aa^dc* eg^ b Vg^an YjZ id]^\]Zg i]^gY+ eVgin eg^ci^c \ VcY di]Zg hZgk^XZh gZkZcjZh, M]Z ^ b eVXi d[i]Z 31gY 1ZZ ^ c [^hXVa 0.00 gZhjaiZY ^ c V gZkZcjZ ^ cXgZVhZ d[Veegdm^b ViZan "/3 b^aa^dc,

$>N` \setminus E;$

KZkZcjZh 1ZgZ "/*..5 b^aa^dc [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.*0.00* Vc ^cXgZVhZ d["43 b^aa^dc* dg 5 #* Vh Xd b eVgZY id [^hXVa 0.0/ gZkZcjZh d["720 b^aa^dc, :YkZgi^h^c\ gZkZcjZh ^cXgZVhZY "4/ b^aa^dc* eg^ b Vg^an YjZ id]^\]Zg Y^\^iVa VYkZgi^h^c\ gZkZcjZh>h ^

j cY^hig^Wj iZY [dgZ^\c ZVgc^c\h 1ZgZ Xdch^YZgZY eZg b VcZcian gZ^ckZhiZY VcY Vh hjX]* Nc^iZY LiViZh [ZYZgVa VcY hiViZ ^cXd b Z iVmZh 1ZgZ cdi egZk^dj han gZXdgYZY dc i]ZhZ ZVgc^c\h, :h V gZhj ai d[i]Z MVm : Xi* hj WhiVci^Vaan Vaa d[i]Z <d b eVcn-h ZVgc^c\h ^c [dgZ^\c hj Wh^Y^Vg^Zh \ZcZgViZY eg^dg id i]Z ZcVXi b Zci d[i]Z MVm : Xi 1ZgZ YZZ b ZY id]VkZ WZZc gZeVig^ViZY VcY iVmZY VXXdgY^c\an, :h d[Cj cZ 1.* 0.00* i]Z <d b eVcn]Vh Veegdm^b ViZan "7.. b^aa^dc d[j cY^hig^Wj iZY [dgZ^\c ZVgc^c\h i]Vi ^i ^i ciZcYhi d gZ^ckZhi eZg b VcZcian, Bi ^h cdi egVXi^XVWaZ id Zhi^b ViZ i]Z V b dj ci d[iVm i]Vi b^\]i WZ eVNVWaZ ^[i]ZhZ ZVgc^c \h 1ZgZ gZeVig^ViZY, M]Z <d b eVcn b Vn gZeVig^ViZ [j j gZ ZVgc^c \h d[XZgiV^c [dgZ^\c 1 ^j M^YVg^Zh ^c 1]^X] XVhZ i]Z <d b eVcn b Vn WZ gZ f j^gZY id VXXg jZ VcY eVn VYY^i^cCVa iVmZh* ^cXaj Y^c \ Vcn Veea^XVWaZ [dgZ^\c 1^i]]daY^c \ iVmZh VcY ^cXd b Z iVmZh,

 $M]Z [daad 1^c \ iVWaZ egZhZcih V gZXdcX^a^Vi^dc d[cZi XVh] egdk^YZY Wn deZgVi^c \ VXi^k^i^Zh id [gZZ XVh] [ad 1 VkV^aVWaZ id GZ 1 h < dgedgVi^dc8$

	:	:`c eYV \\ZdTR] j\Rcd V_U\U >f_V -*k				
		,*,, , [*]				
		_d\$				
GZi XVh] egdk^YZY Wn deZgVi^c \ VXi^k^i^Zh	"	/*132 "	/*015			
EZhh8 <ve^iva jgzh<="" td="" zmezcy^i=""><td></td><td>&277'</td><td>&17.'</td></ve^iva>		&277'	&17.'			
		633	625			
EZhh 8 K : @gdje [gZZ XVh] [ad]		&057'	&/63'			
Iajh8 <vh] [gdb="" gzxz^kzy="" k="" y^k^yzcyh="">: @gdje</vh]>		65	47			
?gZZ XVh] [ad 1 VkV^aVWaZ id GZ 1 h <dgedgvi^dc< td=""><td>11</td><td>441 "</td><td>51/</td></dgedgvi^dc<>	11	441 "	51/			

?gZZ XVh] [ad 1 VkV^aVWaZ id GZ 1 h <dgedgVi[^]dc YZXgZVhZY "46 b[^]aa[^]dc [^]c i]Z [[^]hXVa nZVg ZcYZY CjcZ 1.* 0.00 id "441 b[^]aa[^]dc [gdb "51/ b[^]aa[^]dc [^]c [[^]hXVa 0.0/* eg[^]bVg[^]an YjZ id][^]]Zg XVe[^]iVa ZmeZcY[^]ijgZh VcY][^]]Zg K>: @gdje [gZZ XVh] [ad 1* eVgi[^]Vaan d[[hZi Wn]][^]]Zg cZi XVh] egdk[^]YZY Wn deZgVi[^]c VXi[^]k[^]i[^]Zh Vh Y[^]hXjhhZY VWdkZ VcY][^]]Zg Y[^]k[^]YZcYh gZXZ[^]kZY [gdb K>: @gdje,

6`cc`h1_Xd

: h d[Cj cZ 1.* 0.00* i]Z <d b eVcn* XZgiV^c hjWh^Y^Vg^Zh d[GQ> : jhigVa^V Iin E^b^iZY &i]Z {?dmiZa @gdje| VcY id\Zi]Zg 1^i] hjX] hjWh^Y^Vg^Zh* i]Z {?dmiZa = ZWi @gdje|' VcY K> : @gdje VcY XZgiV^c d[^ih hjWh^Y^Vg^Zh &K> : @gdje VcY XZgiV^c d[^ih hjWh^Y^Vg^Zh* i]Z {K> : = ZWi @gdje|']VY idiVa Wdggd 1^c h d["1,.5 W^aa^dc* ^cXajY^c h i]Z XjggZci edgi^dc, ; di] i]Z ?dmiZa @gdje VcY K> : @gdje VgZ Xdchda^YViZY Wji cdc 1]daan+d 1 cZY hjWh^Y^Vg^Zh d[GZ1h <dge* VcY i]Z^g ^cYZWiZYcZhh ^h dcan \jVgVciZZY Wn bZbWZgh d[i]Z ?dmiZa = ZWi @gdje VcY K> : = ZWi @gdje VcY K> :

$>N ` \ 3X[YX[J]RXW 2X[[X ` RWP \)$

: h d[CjcZ 1.* 0.00* i]Z < d b eV cn]VY &' Wdggd 1^c h d["/*757 b^aa^dc* Xdch^hi^c h d[^ih djihiVcY^c h 0.0/ LZc^dg GdiZh* 0.00 LZc^dg GdiZh VcY MZgb : EdV ch VcY &'' "53. b^aa^dc d[jcYgV 1 c Xdb b^ibZcih VkV^aVWaZ jcYZg i]Z KZkdak^c h ?VX^a^in,

 $\begin{array}{l} & \textbf{Bcc} & \textbf{M} \\ & \textbf{Bcc} & \textbf{M} \\ & \textbf{$

DN[V <XJW 1 JWM BN_XU_RWP 3[NMR] 6JLRUR]RN\

Hc FVgX] 07* 0.00* i]Z <db eVcn iZg b^cViZY ^ih Zm^hi^c\ jchZXjgZY "53. b^aa^dc gZkdak^c\ XgZY^i [VX^a^in VcY ZciZgZY ^cid i]Z 0.00 <gZY^i : \gZZ bZci i]Vi egdk^YZh [dg "/*03. b^aa^dc d[jchZXjgZY XgZY^i [VX^a^irZh Xd beg^hZY d[i]Z "3.. b^aa^dc MZg b : ?VX^a^in VcY i]Z "53. b^aa^dc KZkdak^c\ ?VX^a^in i]Vi XVc WZ jhZY [dg \ZcZgVa XdgedgViZ ejgedhZh, M]Z <db eVcn Wdggd 1ZY i]Z [jaa Vbdjci d[i]Z MZgb : ?VX^a^in Yjg^c\ i]Z [djgi] fjVgiZg d[[^hXVa 0.00* VcY i]Z KZkdak^c\ ?VX^a^in gZb V^ch jcYgV 1c Vh d[CjcZ 1.* 0.00, dc Vcn jcYgV1c WVaVcXZ jcYZg i]Z KZkdak^c\ ?VX^a^in VcY* 1^i] gZheZXi id Vcn djihiVcY^c\ Wdggd1^c\h jcYZg i]Z ?VX^a^i^Zh* Vc Veea^XVWaZ b Vg\^c d[

$\label{eq:main_state} M]Z \ [daad 1^c \ iVWaZ \ hj \ b \ bVg^oZh \ i]Z < d \ b \ eVcn~h \ b \ ViZg^Va \ [^gb \ Xd \ b \ b^ib \ Zcih \ Vh \ d[\ CjcZ \ 1.* \ 0.008]$

	$\frac{5d \forall sf_V - *i , *, }{bt_V - *i - bt_V - bt_V$									
	H`eR]	DR @Vdd eYR_ + jVRc	<u>kj ^ V_ed 8 fV Sj DVc</u> +'- jVRcd	-'/ jVRcd	A`cV eYR_ / jVRcd					
		-	#Z_ ^ Z]]Z`_d\$							
$I j g X] VhZ dWa^{Vi^{d}ch^{kV'}}$	" 71.	" 247	" 106	" 47	" 42					
Ledgih egd\gV b b^c\ g^{N}]ih ^{&W'}	/*5.6	24.	573	16/	50					
$Igd gV b b^c Xdhih^{dX'}$	346	040	050	1.	2					
$HeZgVi^c \setminus aZVhZh^{aY'}$										
MgVch b ^hh^dc Xdhih ^{&Z'}	/5.	04	24	13	41					
EVcY VcY Wj^aY^c\h	/*/04	/17	023	0/5	303					
IaVci VcY bVX]^cZgn	11	3	3	/	Z					
?^cVcXZ aZVhZh										
MgVch b ^hh^dc Xdhih ^{&Z'}	5.	07	2/	Z	Z					
; dggd 1 ^c \h ^{&['}	1*.05	05/	461	261	/*37.					
BciZgZhi eVn bZcih dc Wdggd $1^c h^{t'}$	5/.	//6	0.4	/55	0.7					
MdiVa Xd b b^i bZcih VcY XdcigVXi j Va dWa^\Vi^dch	" 6*10.	" /*557	" 0*40/	" /*171	" 0*305					

 &V'
 M]Z <dbeVcn]Vh Xdb b^ibZcih jcYZg ejgX]VhZ dWa^\Vi^dch gZaViZY id b^c^b j b hjWhXg^WZg \jVgVciZZh [dg a^XZchZ [ZZh*</td>

 eg^ci^c\ XdcigVXih* XVe^iVa egd_ZXih* bVg`Zi^c\ V\gZZ bZcih* egdYjXi^dc hZgk^XZh VcY di]Zg aZ\Vaan W^cY^c\ Xdb b^ibZcih,

 $\label{eq:model} \& W' \qquad M]Z < db eVcn]Vh hedgih egd gV b b^c g^l ih Xd b b^ibZcih 1^i] i]Z GVi^dcVa Kj Wn EZV jZ^* : jhigVa^Vc ?ddiWVaa EZV jZ VcY < g^X Zi : jhigVa^V* Vh 1Zaa Vh XZgiV^c di]Zg WgdVYXVhi g^l ih 1]^X] VgZ eVnVWaZ i]gdj] [^hXVa 0.06,$

X' M]Z <d b eVcn]Vh egd\gV b b^c\ g^\]ih Xd b b^ib Zcih 1^i] kVg^djh hjeea^Zgh [dg egd\gV b b^c\ XdciZci,

&Y' M]Z <d b eVcn aZVhZh d[[^XZ [VX^a^i^Zh* 1 VgZ]djhZ [VX^a^i^Zh* eg^ci^c \ eaVcih* hViZaa^iZ hZgk^XZh VcY Zfj^e bZci, M]ZhZ aZVhZh* 1]^X] VgZ XaVhh^[^ZY Vh deZgVi^c \ aZVhZh* VgZ ZmeZXiZY id WZ eV^Y Vi XZgiV^c YViZh i]gdj \] [^hXVa 0.26, : b dj cih gZ[aZXiZY gZegZhZci dcan i]Z <d b eVcn~h aZVhZ dWa^\Vi^dch [dg 1]^X] ^i]Vh [^gb Xd b b^i bZcih,</p>

&Z' M]Z <dbeVcn]Vh XdcigVXijVa Xdbb^ibZcih [dg hViZaa^iZ igVchb^hh^dc hZgk^XZh, M]Z <dbeVcn~h hViZaa^iZ igVchedcYZg hZgk^XZh VggVc\ZbZcih ZmiZcY i]gdj\] [^hXVa 0.10 VcY VgZ VXXdjciZY [dg Vh deZgVi^c\ dg [^cVcXZ aZVhZh* WVhZY dc i]Z jcYZgan^c\ iZgbh d[i]dhZ VggVc\ZbZcih,</p>

 $\label{eq:linear} \& [LZZ \ GdiZ \ 7 \ z \ ; dgd \ l^c \ h^c \ i \] Z \ VXXd \ b \ eVcn^c \ \langle dchda^{A}YViZY \ ?^cVcX^{A}Va \ LiViZ \ b \ Zcih,$

 , NMSIMGEMCIER

 $[dg ^b eV^g bZci, Ad I ZkZg^* ^[i]Z < d b eVcn XdcXaj YZh di]Zg 1 ^hZ dg ZaZXih cdi id eZg[dg b i]Z fjVa^iVi^kZ VhAzhh bZci*i]Zc ^i ^h gZfj^gZY id eZg[dg b V fjVci^iVi^kZ VcVanh^h id YZiZg b^cZ i]Z [V^g kVajZ d[i]Z gZedgi^c \ jc^i* VcY Xd b eVgZ i]Z XVaXjaViZY [V^g kVajZ d[V gZedgi^c \ jc^i 1^i] ^ih XVggn^c V bdjci* ^cXaj Y^c \ ddY 1^aa, M]Z < d b eVcn YZiZg b^cZh i]Z [V^g kVajZ d[V gZedgi^c \ jc^i eg^b Vg^an Wn jh^c \ Wdi] V Y^hXdjciZY XVh] [ad 1 VcVanh^h VcY b Vg `Zi+WVhZY kVajVi^dc VeegdVX],$

 $= ZiZg b^c^c [V^g kVajZ gZf j^gZh i]Z ZmZgX^hZ d[h^c^[^XVci_jY bZcih^*CXajY^c _jY bZcih VWdji Veegdeg^ViZ Y^hXdjci gViZh^* adc + iZg b \gd1i] gViZh^* gZaZkVci Xd beVgVWaZ Xd beVcn ZVgc^c h bjai^eaZh VcY i]Z Vbdjci VcY i^b^c d[ZmeZXiZY [jijgZ XVh] [ad 1 h, = jg^c i] fjVgiZg d[[^hXVa 0.00^* Vh eVgi d[i]Z <dbeVcn^h adc +gVc \Z eaVcc^c \ egdXZhh^* i]Z <dbeVcn Xd beaZiZY ^ih VccjVa \ddY 1^aa VcY ^cYZ[^c^iZ+a^kZY ^ciVc ^WaZ VhhZi ^b eVgbZci iZhi,$

 $M]Z eZg[dg b VcXZ d[i]Z < d b eVcn-h VccjVa ^b eV^g b Zci VcVanh^h gZh jaiZY ^c cd ^b eV^g b Zcih id \ddY 1 ^aa VcY ^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhhZih ^c [^hXVa 0.00, L^\c^[^XVci jcdWhZgkVWaZ ^cejih ji^a^oZY ^ci]Z ^cXd b Z VeegdVX] kVajVi^dc bZi]dY 1ZgZ Y^hXdjci gViZh &gVc \^c \ [gd b 6, # id /7, # i' adc \+iZg b \gd 1i] gViZh &gVc \^c \ [gd b /, # id 1, # 'VcY gdnVain gViZh &gVc \^c \ [gd b .,03 # id 5, # ', L^\c^[^XVci jcdWhZgkVWaZ ^cejih ji^a^oZY ^ci]Z b Vg Zi VeegdVX] kVajVi^dc bZi]dY 1ZgZ ; BM = : b jai^eaZh [gd b \j^YZa^cZ e jWa^X X d b eVc^Zh deZgVi^c \ ^c h^b ^aVg ^cYjhig^Zh VcY Xdcigda egZ b^j b h &gVc \^c \ [gd b 3, # id /., # ', L^\c^[^XVci ^cYXci ^cYZgZVhZh &YZZgZVhZh 'c gdnVain gViZh \ \gd 1i] gViZh Xdcigda egZ b^j b h VcY b jai^eaZh * Vhhj b^c \ cd X]Vc \Z ^c Y^hXdjci gViZh * 1djaY gZhjai ^c V h^\c^[^XVcian]^]Zg &ad 1Zg' [V^g kVajZ bZVhjgZ bZci, L^\c^[^XVci YZXgZVhZh &cYaXd beVcn^\ aLiViZbZcih [dg X]Vc \Are gdnVain gViZh * \gd 1i] gViZh * Xdcigda egZ b^j b h VcY b jai^eaZh * 0 h^\c^[^XVcian]^]Zg &ad 1Zg' [V^g kVajZ bZVhjgZ bZci, L^\c^[^XVci YZXgZVhZh &cYaXd beVcn^\ aLiViZbZcih [dg [jgi]Zg YZiVah gZ VgYc \ X]Vc \Z h c i]Zh ^cejih VcY Vhj b ei^dch Xd b eVgZY id eg^d [^hXVa nZVgh,$

: h d[CjcZ 1.* 0.00* i]ZgZ 1ZgZ cd gZedgi^c $jc^{h} 1^{i} dY 1^{a} Vi+g^{h} [dg [jijgZ^{beV}gbZci, M]Z < dbeVcn 1^{a} Xdci^c jZ id b dc^{i} dg ^{i} dY 1^{a} [dg edhh^WaZ [jijgZ^{beV}gbZci, M]Z < dbeVcn 1^{a} Xdci^{c} jZ id b dc^{i} dy 1^{a} [dg edhh^WaZ [jijgZ^{beV}gbZci, M]Z < dbeVcn 1^{a} Xdci^{c} jZ id b dc^{i} dy 1^{a} [dg edhh^WaZ [jijgZ^{beV}gbZci, M]Z < dbeVcn 1^{a} Xdci^{c} jZ id b dc^{i} dy 1^{a} [dg edhh^WaZ [jijgZ^{beV}gbZci, M]Z < dbeVcn 1^{a} Xdci^{c} jZ id b dc^{i} dy 1^{a} [dg edhh^WaZ [jijgZ^{beV}gbZci, M]Z < dbeVcn 1^{a} Xdci^{c} jZ id b dc^{i} dy 1^{a} [dg edhh^WaZ [jijgZ^{beV}gbZci, M]Z < dbeVcn 1^{a} [dg edhh^WaZ [dg edhh^WaZ [dg edhh^Wz [dg edh$

9QNGQALLIMG , NRSR

<dhih ^cXjggZY ^c VXfj^g^c \ egd\gV b b^c \ g^\]ih VgZ VXXdjciZY [dg ^c VXXdgYVcXZ 1^i] : L< 70.* {>ciZgiV^c b Zci z ; gdVYXVhiZgh,| Igd\gV b b^c \ g^\]ih VcY i]Z gZaViZY a^VW^a^i^Zh VgZ gZXdgYZY Vi i]Z \gdhh V b djci d[i]Z a^VW^a^i^Zh 1]Zc i]Z a^XZchZ eZg^dY]Vh WZ\jc* i]Z Xdhi d[i]Z egd\gV b ^h YZiZg b^cVWaZ VcY i]Z egd\gV b ^h VXXZeiZY VcY VkV^aVWaZ [dg V^g^c \, Igd\gV b b^c \ Xdhih VgZ V b dgi^cYY WVhZY dc i]Z ZmeZXiZY eViiZgc d[Xdchj b ei^dc dkZg i]Z a^XZchZ eZg^dY dg ZmeZXiZY jhZ[ja a^[Z d[ZVX] egd\gV b * 1]^X] gZfj^gZh h^\c^[^XVci_jY \ bZci, M]Z eViiZgc d[Xdchj b ei^dc ^h WVhZY eg^ b Vg^an dc Xdchj b Zg k^Z I Zgh]^e ^c[dg b Vi^dc Vh 1 Zaa Vh di]Zg [VXidgh, B[^c^i^Va V^g^c \ h VgZ ZmeZXiZY id \ZcZgViZ]^]Zg k^Z I Zgh]^e* Vc VXXZaZgViZY b Zi]dY d[V b dgi^oVi^dc ^h jhZY, M]Z < d b eVcn b dc^idgh ^ih egd\gV b b^c \ V b dgi^oVi^dc eda^Xn dc Vc dc \d^c \ WVh^h VcY Vcn ^ b eVXi Vg^h^c \ [gd b X]Vc \Zh id i]Z eda^Xn 1 dj aY WZ gZXd\c^oZY egdheZXi^kZan, M]Z <d b eVcn gZ \ jaVgan gZk^Z 1 h ^ih egd\gV b b^c \ VhhZih id ZchjgZ i]Zn Xdci^cjZ id gZ[aZXi [V^g kVajZ, <]Vc \Zh ^c X^gXj b hiVcXZh b Vn gZhjai ^c V 1g^iZ+Yd 1 c d[i]Z VhhZi id [V^g kVajZ, M]Z <d b eVcn]Vh h^c \aZ VcY b jai^+nZVg XdcigVXih [dg WgdVYXVhi g^\]ih d[hedgi^c \ ZkZcih, M]Z Xdhih d[hedgih XdcigVXih VgZ eg^ b Vg^an X]Vg\ZY id ZmeZchZ dkZg i]Z gZheZXi^kZ hZVhc Vh ZkZcih VgZ V^gZY, ?dg hedgih XdcigVXih 1^i] YZY^XViZY X]VccZah* i]Z <d b eVcn V b dgi^oZh i]Z hedgih egd\gV b b^c \ g^\]ih Xdhih dkZg /0 b dci]h,

2MCNLE <AWER

 $M]Z < db eVcn ^h hjW_ZXi id ^cXd bZ iVmZh ^c i]Z N,L, VcY kVg^djh [dgZ^\c_jg^hY^Xi^dch ^c 1]^X] ^i deZgViZh VcY gZXdgYh ^ih iVm egdk^h^dc [dg i]Z Vci^X^eViZY iVm XdchZf jZcXZh ^c ^ih gZedgiZY gZh jaih d[deZgVi^dch, MVm aV 1 h VgZ Xd b eaZm VcY hjW_ZXi id Y^[[ZgZci ^ciZgegZiVi^dch Wn i]Z iVmeVnZg VcY gZheZXi^kZ \dkZgc bZciVa iVm^c \ Vji]dg^i^zh, L^\c^[^XVci_jY \ bZci ^h gZf j^gZY ^c YZiZg b^c^c \ i]Z < db eVcn~h iVm ZmeZchZ VcY ^c ZkVajVi^c \ ^ih iVm edh^i^dch ^cXajY^c \ ZkVajVi^c \ jcXZgiV^ci^Zh Vh egd b ja \ ViZY jcYZg : L < 52.* {BcXd bZ MVmZh,}$

 $M]Z < d b e V cn^{h} V cc j Va i Vm g ViZ ^{h} W VhZY eg^{b} Vg^{an} dc ^{ih} Vd g Ve]^{X} ^{c} X d b Z V cY hiVi jidgn i Vm g ViZh ^{c} i]Z kVg^{d}jh _jg^{h}Y^{Xi^{d}ch ^{c}} 1]^{X}] ^{i} de Zg ViZh, L^{c^{A}Xvci} b V cV VZ b Zci _j Y b Zci ^{h} g Zf j^{g}ZY ^{c} YZi Zg b^{c^{c}} i]Z < d b e V cn^{h} egdk^{h^{d}c} [dg ^{c}Xd b Z i Vm Zh^{*} YZ[ZggZY i Vm VhhZih V cY a^{VW^{a^{i}}Zh V cY i}]Z kVa j Vi^{d}c Vaad 1 V cXZ g ZXdg YZY V V^{chi} i]Z < d b e V cn^{h} cZi YZ[ZggZY i Vm VhhZih^{[V cn, Bc]} VhZh^{c} i]Z a^{2a^{d}} d d [gZVa^{o}Vi^{d}c d [YZ[ZggZY i Vm VhhZih^{*} b V cV Z b Zci Xdch^{YZgh Zhi^{h}b ViZh d [i]Z V b d j ci V cY X] VgVXiZg d [$

i]Z <dchda^YViZY ?^cVcX^Va LiViZbZcih [gdb hjX] edh^i^dch VgZ i]Zc bZVhjgZY WVhZY dc i]Z aVg\Zhi WZcZ[^i i]Vi]Vh V \gZViZg i]Vc 3. # a^ Za^]ddY d[WZ^c\ gZVa^oZY jedc jai^bViZ hZiiaZbZci, L^\c^[^XVci bVcV\ZbZci _jY\bZci ^h gZfj^gZY id YZiZgb^cZ 1]Zi]Zg i]Z gZXd\c^i^dc i]gZh]daY]Vh WZZc bZi VcY* ^[hd* i]Z Veegdeg^ViZ Vbdjci d[jcgZXd\c^oZY iVm WZcZ[^ih id WZ gZXdgYZY ^c i]Z <dchda^YViZY ?^cVcX^Va LiViZbZcih, F VcV\ZbZci gZ+ZkVajViZh iVm edh^i^dch ZVX] eZg^dY ^c 1]^X] cZ1 ^c[dg bVi^dc VWdji gZXd\c^i^dc dg bZVhjgZbZci WZXdbZh VkV^aVWaZ, M]Z <dbeVcn-h eda^Xn ^h id gZXd\c^oZ* 1]Zc Veea^XVWaZ* ^ciZgZhi VcY eZcVai^Zh dc jcgZXd\c^oZY ^cXdbZ iVm WZcZ[^ih Vh eVgi d[BcXdbZ iVm &ZmeZchZ' WZcZ[^i,

: ESIQE LEMS + EMEFIS 8 BKIGASINMR

M]Z <dbeVcn 1^aa jhZ V 1Z^\]iZY VkZgV\Z adc\+iZg b gViZ d[gZijgc d[2,1 # [dg [^hXVa 0.01 WVhZY eg^cX^eVaan dc V Xd b W^cVi^dc d[XjggZci VhhZi b^m VcY Vc ZmeZXiVi^dc d[[jijgZ adc\ iZg b ^ckZhi b Zci gZijgch, M]Z VXXj b jaViZY cZi egZ+iVm adhhZh dc i]Z <d b eVcn-h eZch^dc eaVch Vh d[CjcZ 1.* 0.00 1ZgZ Veegdm^b ViZan "237 b^aa^dc 1]^X] YZXgZVhZY [gd b Veegdm^b ViZan "320 b^aa^dc [dg i]Z <d b eVcn-h eZch^dc eaVch Vh d[CjcZ 1.* 0.00, M]^h cZi YZXgZVhZ d["61 b^aa^dc 1 Vh eg^b Vg^an YjZ id XjggZcXn bdkZ b Zcih VcY j cgZXd \c^oZY adhhZh V b dgi^oZY Yjg^c \ [^hXVa 0.00, Ed 1 Zg Y^hXdj ci gViZh ^cXgZVhZ egZhZci kVajZh d[WZcZ[^i dWa^\Vi^dch VcY ^cXgZVhZ i]Z <d b eVcn-h YZ[ZggZY adhhZh VcY Vahd ^cXgZVhZ hjWhZfjZci+nZVg WZcZ[^i Xdhih, A^\]Zg Y^hXdj ci gViZh YZXgZVhZ i]Z egZhZci kVajZh d[WZcZ[^i dWa^\Vi^dch VcY gZYjXZ i]Z <d b eVcn-h VXXj b jaViZY cZi adhh VcY YZXgZVhZ hjWhZfjZci+nZVg WZcZ[^i Xdhih, M]ZhZ YZ[ZggZY $gZfj^gZbZcih^* [jcY^c \land ci]Z Veegdeg^ViZ adXVa XjggZcX^Zh^h bVYZ VkV^aVWaZ [gdb \land ciZgXdbeVcn XVe^iVa, M]Z < dbeVcn YdZh cdi]ZY \Z ^ih ^ckZhi bZcih ^ci]Z cZi VhhZih d[^ih : jhigVa^Vc VcY N,D, deZgVi^dch,$

; ZXVIJhZ d[[kajXijVi^dch ^c ZhX}YZi^XdgViZgd b]Zi}VildviZgh h jZi}ViliXivchi^h h jW_ZXi id XjgZcXn YgVchaVXdc g^hc dc i [ZdzBh]; gNXd[[%dd cde BgVi*dch], Z Y >V ?dgZ^c XjggZcXn igVchaVi^dc g^h ` h i]Z g^h ` i]Vi ZmX]Vc Z gViZ \V^ch dg adhhZh Vg^hZ [gd b igVchaVi^c \ [dgZ^c c Zci^i^Zh- hiViZ bZcih d[ZVgc^c h VcY WVaVcXZ h]ZZih [gd b i]Z^g [jcXi^dcVa XjggZcXn id i]Z <d b eVcn~h gZedgi^c \ XjggZcXn & i]Z N,L, YdaaVg' [dg Xdchda^YVi^dc ejgedhZh, M]Z <d b eVcn YdZh cdi]ZY\Z igVchaVi^dc g^h ` WZXVjhZ ^i \ZcZgVaan \ZcZgViZh edh^i^kZ XVh] [ad 1 h [gd b ^ih ^ciZgcVi^dcVa deZgVi^dch i]Vi VgZ ine^XVaan gZ^ckZhiZY adXVaan, >mX]Vc \Z gViZh 1^i] i]Z bn, g V a a %o e j g e

	B`eZ JR		:R/c 、	JR]fV	GV_dℤ ₩c` 5Ug +* 7YR_ :`c' 9 iTY FR	VcdV '' XV 2_ VZX_	GV_dZe Wc` 5 UgV +* 7 YR_2 =_eVo FRe	× VcdV V XV I_ zVde
?dgZ^\c XjggZcXn YZg^kVi^kZh	NL"	0/	NL"	/	NL"	å0'		c-V
<gdhh+xjggzcxn ^cizgzhi="" gviz="" h="" l="" td="" veh<=""><td>NL"</td><td>13.</td><td>NL"</td><td>76</td><td>NL"</td><td>å17'</td><td>NL"</td><td>Z</td></gdhh+xjggzcxn>	NL"	13.	NL"	76	NL"	å17'	NL"	Z
BciZgZhi gViZ YZg^kVi^kZh	: "	13.	NL"	7		c-V	NL"	&/'
BciZgZhi gViZ YZg^kVi^kZh	NL"	3	NL"	/3		c-V	NL"	&O'

: cn gZhjai^ac \ X]Vc \Zh ^c i]Z [V^ag kVajZ d[i]Z YZg^akVi^akZ [^cVcX^Va ^cchigj bZcih bVn WZ eVgi^AVaan d[[hZi Wn X]Vc \Zh ^c i]Z [V^ag kVajZ d[XZgiV^ac WVaVcXZ h]ZZi edhⁱdch & eg^a bVg^an N,L, YdaaVg YZcd b^cViZY a^AVW^aaⁱZh' ^b eVXiZY Wn i]Z X]Vc \Z ^c i]Z [dgZ^a c ZmX]Vc \Z gViZh, M]Z VW^aaⁱn id gZY jXZ i]Z ^b eVXi d[XjggZcXn [ajXijVi^dch dc ZVgc^ac \ hYZeZcYh dc i]Z bV \cⁱjYZ d[i]Z YZg^akVi^AkZh Xd b eVgZY id i]Z WVaVcXZ h]ZZi edhⁱdch Yjg^ac \ ZVX] gZedgi^ac \ XnXaZ,

=_eVcVde FReV FZd\

M]Z <dbeVcn-h XjggZci [^cVcX^c \ VggVc \ZbZcih VcY [VX*a*i^Zh ^cXajYZ "0*.41 b*aa*dc d[djihiVcY^c \ [^mZY+gViZ YZWi VcY "717 b*aa*dc d[djihiVcY^c \ KVg^VWaZ+gViZ WVc` [VX*a*i*Zh*WZ[dgZ VY_jhi bZcih [dg jcV bdgi*oZY Y*hXdjci VcY YZWi *hhj VcXZ Xdhih & LZZ GdiZ 7 z ; dggd 1 ^c h *c i]Z VXXd beVcn^c \ <dchda*YViZY ?^cVcX*Va LiViZ bZcih', ?*mZY VcY KVg*VWaZ+gViZ YZWi hygZ *b eVXiZY Y^[[ZgZcian Wn X]Vc \Zh *c ^ciZgZhi gViZh, : X]Vc \Z *c i]Z bVg `Zi *ciZgZhi gViZ dg n*ZaY d[[*mZY+gViZ YZWi 1 *aa dcan *b eVXi i]Z [V*g bVg`Zi kVajZ d[hjX] YZWi* 1]*aZ V X]Vc \Z *c i]Z bVg `Zi *ciZgZhi gViZ dg n*ZaY d[[*mZY+gViZ YZWi 1 *aa dcan *b eVXi i]Z [V*g bVg`Zi kVajZ d[hjX] YZWi* 1]*aZ V X]Vc \Z *c i]Z bVg `Zi *ciZgZhi gViZ dg n*ZaY d[[*mZY+gViZ YZWi 1 *aa dcan *b eVXi *i]Z [V*g bVg`Zi kVajZ d[hjX] YZWi* 1]*aZ V X]Vc \Z *c i]Z bVg `Zi *ciZgZhi gViZ dg n*ZaY d[[*mZY+gViZ YZWi 1 *aa *b eVXi *ciZgZhi ZmeZchZ* Vh 1 Zaa Vh i]Z V bdjci d[XVh] gZ fj*gZY id hZgk*XZ hjX] YZWi, Bc XdccZXi*dc 1*i] i]ZhZ Wdggd 1*c \h* GZ 1h <dgedgVi*dc]Vh ZciZgZY *cid vc *ciZgZhi gViZ h Ve XVh] [ad 1]ZY \Z id [*m i]Z [adVi*c \ gViZ *ciZgZhi gViZ cb*cViZY [*mZY gViZ *ciZgZhi eVn bZcih [dg : jhigV*vC YdaaVg YZcd b*cViZY KVg*VWaZ gViZ eVn bZcih, : h Y*hXjhhZY WdkZ* i]Z ?dmiZa @gdje ji*a*oZh Xgdh+XjggZcXn *ciZgZhi gViZ h 1 Veh id]ZY \Z V edgi*dc d[i]Z *ciZgZhi gViZ g*h` gZaviZY id *ciZgZhi vCY eg*cX*eVa eVn bZcih dc *hi N,L, YdaaVg YZcd b*cViZY YZWi, M]Z ?dmiZa @gdje]Vh Vahd ji*a*oZY XZgiV*c YZg*kVi*kZ *chigj bZcih id h 1 Ve : jhigVa*Vc YdaaVg YZcd b*cViZY kVg*VWaZ *ciZgZhi gViZ h 1 Ve AdcigVi = jhigVa*Vc YdaaVg YZcd b*cViZY kVg*VWaZ *ciZgZhi gViZ h 1 Ve AdcigVi = jhigVa*Vc YdaaVg YZcd b*cViZY kVg*VWaZ *ciZgZhi gViZ h 1 Ve AdcigVi = jhigVa*Vc YdaaVg YZcd b*cViZY kVg*VWaZ *ciZgZhi gViZ eVn bZcih, : h d*d*c VcY *3... b*aa*dc [dg ?dmiZa @gdje VcY GZ 1h <dgedgVi*dc Wdgd 1*c \h* gZheZXi*kZan, KZ[zg id i]Z iVWaZ WdkZ [dg [jgi]Zg YZiV*ah d[i]Z hZch*i*k*n*n [i]Z <dbeVcn*h [*cVC*Va *chigj bZcih 1]*X] VgZ hjWzXi id *ciZgZhi gViZ g*K`, z *cvcx*va 8chig b

Ge`T\ DcZTVd

M]Z <d b eVcn]Vh Xd b b dc hidX` ^ckZhi b Zcih ^c e j Wa^Xan igVYZY Xd b eVc^Zh i]Vi VgZ h j W_ZXi id b Vg`Zi eg^XZ kdaVi^a^in, M]ZhZ ^ckZhi b Zcih]VY Vc V\\gZ\ViZ [V^g kVajZ d[Veegdm^b ViZan "/.7 b^aa^dc Vh d[Cj cZ 1.* 0.00, :]nedi]Zi^XVa YZXgZVhZ ^c i]Z b Vg`Zi eg^XZ d[i]ZhZ ^ckZhi b Zcih d[/. # 1 d jaY gZh jai ^c V YZXgZVhZ ^c ^cXd b Z d[Veegdm^b ViZan "// b^aa^dc WZ[dgZ iVm,

7 cVUZe FZd \

<Vh] VcY XVh] Zfj^kVaZcih VgZ bV^ciV^cZY 1^i] bjai^eaZ [^cVcX^Va ^chi^iji^dch, =Zedh^ih]ZaY 1^i] WVc`h bVn ZmXZZY i]Z V bdjci d[^chjgVcXZ egdk^YZY dc hjX] YZedh^ih, @ZcZgVaan* i]ZhZ YZedh^ih bVn WZ gZYZZ bZY jedc YZ bVcY VcY VgZ bV^ciV^cZY 1^i] [^cVcX^Va ^chi^iji^dch d[gZejiVWaZ XgZY^i VcY* i]ZgZ[dgZ* WZVg b^c^bVa XgZY^i g^h`,

 $M]Z < db eVcn + gZXZ^kVWaZh Y^Y cdi gZegZhZci h^c^[^XVci XdcXZcigVi^dch d[XgZY^i g^h` Vh d[CjcZ 1.* 0.00 dg CjcZ 1.* 0.0/ YjZ id i]Z 1^YZ kVg^Zin d[Xjhid bZgh* bVg`Zih VcY \Zd\gVe]^X VgZVh id 1]^X] i]Z < db eVcn + egdY jXih VcY hZgk^XZh VgZ hdaY,$

 $M]Z < d b e V cn b dc^i dgh 'ih e dh'i' dch 1'i]* VcY i]Z XgZY'i f j Va'in d[* i]Z [^cVcX'Va 'chi'iji' dch 1]^X] VgZ Xdj ci ZgeVgi'Zh id 'ih [^cVcX'Va 'chigj b Zcih, M]Z < d b e V cn 'h ZmedhZY id XgZY'i adhh 'c i]Z ZkZci d[cdceZg[dg b VcXZ Wn i]Z Xdj ci ZgeVgi'Zh id i]Z V\gZZ b Zcih, :h d[Cj cZ 1.* 0.00* i]Z < d b e V cn Y'Y cdi Vci'X'eViZ cdceZg[dg b VcXZ Wn V cn d[i]Z Xdj ci ZgeVgi'Zh,$

$AR_RXV \wedge V_{erd} FVa`ce`_ = _eVc_R] 7`_ec`] CgVc : I_R_TIR] FVa`ceI_X W`c > f_V - *k , *, ,$

F VcV\Zb Zci d[GZ 1 h <dgedgVi^dc ^h gZhedch^WaZ [dg ZhiVWa^h]^c\ VcY b V^ciV^c^c\ VYZ f j ViZ ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\ Vh YZ[^cZY ^c K j aZh /1V+/3&[' VcY /3Y+/3&[' j cYZg i]Z LZXjg^i^Zh >mX]Vc\Z : Xi d[/712* Vh V b ZcYZY* VcY [dg i]Z Vh/Zhh b Zci d[i]Z Z[[ZXi^kZcZhh d[^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\, GZ 1 h <dgedgVi^dc-h ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\, GZ 1 h <dgedgVi^dc-h ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\, GZ 1 h <dgedgVi^dc-h ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\ ^h V egdXZhh YZh^\cZY id egdk^YZ gZVhdcVWaZ VhhjgVcXZ gZ\VgY^c\ i]Z gZa^VW^a^in d[[^cVcX^Va gZedgi^c\ VcY i]Z egZeVgVi^dc d[[^cVcX^Va hiViZ bZcih [dg ZmiZgcVa ejgedhZh ^c VXXdgYVcXZ 1^i] VXXdjci^c\ eg^cX^acaZh \ZcZgVaan VXXzeiZY ^c i]Z Nc^iZY LiViZh d[: bZg^XV, M]Z <d b eVcn-h ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\ ^cXajYZh i]dhZ eda^X^Zh VcY egdXZY jgZh i]Vi8

- u eZgiV[^]c id i]Z bV[^]ciZcVcXZ d[gZXdgYh i]Vi^{*} [^]c gZVhdcVWaZ YZiV[^]a^{*} VXXjgViZan VcY [V[^]gan gZ[aZXi i]Z igVchVXi[^]dch VcY Y[^]hedh[^]i[^]dch d[i]Z VhhZih d[GZ1h <dgedgVi[^]dc9
- u egdk^YZ gZVhdcVWaZ VhhjgVcXZ i]Vi igVchVXi^dch VgZ gZXdgYZY Vh cZXZhhVgn id eZg b^i egZeVgVi^dc d[[^cVcX^Va hiViZ bZcih ^c VXXdgYVcXZ 1^i] VXXdjci^c\ eg^cX^eaZh \ZcZgVaan VXXZeiZY ^c i]Z Nc^iZY LiViZh d[: bZg^XV9
- u egdk^YZ gZVhdcVWaZ VhhjgVcXZ i]Vi gZXZ^eih VcY ZmeZcY^ijgZh d[GZ l h <dgedgVi^dc VgZ WZ^c\ b VYZ dcan ^c VXXdgYVcXZ l^i] Vji]dg^oVi^dch d[b VcV\Zb Zci VcY Y^gZXidgh d[GZ l h <dgedgVi^dc9 VcY
- u egdk^YZ gZVhdcVWaZ VhhjgVcXZ gZ\VgY^c\ egZkZci^dc dg i^bZan YZiZXi^dc d[jcVji]dg^oZY VXfj^h^i^dc* jhZ dg Y^hedh^i^dc d[VhhZih i] Vi XdjaY]VkZ V bViZg^Va Z[[ZXi dc i]Z Xdchda^YViZY [^cVcX^Va hiViZbZcih,

 $BciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c \ ^cXaj YZh i]Z Xdcigdah i]ZbhZakZh^* bdc^idg^c \ VcY \ ^ciZgcVa VjY^i^c \ egVXi^XZh VcY VXi^dch iV^Zc id XdggZXi YZ[^X^ZcX^Zh Vh ^YZci^[^ZY,$

; ZXV jhZ d[^ih ^c]ZgZci a^b^iVi^dch* ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c* cd b ViiZg]d1 1 Zaa YZh^\cZY* b Vn cdi egZkZci dg YZiZXi b ^hhiViZ b Zcih, : XXdgY^c\an* ZkZc Z[[ZXi^kZ ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\ XVc egdk^YZ dcan gZVhdcVwaZ VhhjgVcXZ 1^i] gZheZXi id [^cVcX^Va hiViZ b Zci egZeVgVi^dc, : ahd* i]Z VhhZhh b Zci d[i]Z Z[[ZXi^kZcZhh d[^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c\ 1 Vh b VYZ Vh d[V heZX^[^X YViZ, Igd_ZXi^dch d[Vcn ZkVaj Vi^dc d[Z[[ZXi^kZcZhh id [jijgZ eZg^dYh VgZ hjW_ZXi id i]Z g^h` i]Vi Xdcigdah b Vn WZXd b Z ^cVYZfjViZ WZXVj hZ d[X]Vc\Zh ^c XdcY^i^dch* dg i]Vi i]Z YZ\gZZ d[Xd b ea^VcXZ 1^i] i]Z eda^X^Zh dg egdXZY jgZh b Vn YZiZg^dgViZ,

 $\label{eq:started_st$

$FVa^ce^W = UVaV_UV_e FVXIdeVcVUDfS]IT 5TT^f_eI_X : Ic^$

Md i]Z ; dVgY d[=^gZXidgh VcY LidX`]daYZgh d[GZ1h <dgedgVi^dc8

$Cal_l^{-} e W : l_R_T R GeReV^V_ed$

PZ]VkZ VjY^AiZY i]Z VXXd b eVcn^Ac \ Xdchda^AYViZY WVaVcXZ h]ZZih d[GZ1h <dgedgVi^Adc &i]Z <d b eVcn' Vh d[Cj cZ 1.* 0.00 VcY 0.0/* i]Z gZaViZY Xdchda^AYViZY hiViZ b Zcih d[deZgVi^Adch^{*} Xd b egZ]Zch^AkZ ^AcXd b Z &adhh'* Zf j^Ain* VcY XVh] [ad 1h [dg ZVX] d[i]Z i]gZZ nZVgh ^Ac i]Z eZg^AdY ZcYZY Cj cZ 1.* 0.00* VcY i]Z gZaViZY cdiZh &XdaaZXi^AkZan gZ[ZggZY id Vh i]Z {Xdchda^AYViZY [^AcVcX^AVa hiViZ b Zcih|', Bc djg de^Ac^Adc^{*} i]Z Xdchda^AYViZY [^AcVcX^AVa hiViZ b Zcih egZhZci [V^Agan* ^Ac Vaa b ViZg^AVa gZheZXih^{*} i]Z [^AcVcX^AVa edh^Ai^Adc d[GZ 1h <dgedgVi^Adc Vi Cj cZ 1.* 0.00 VcY 0.0/* VcY i]Z gZhjaih d[^Aih deZgVi^Adch VcY ^Aih XVh] [ad 1h [dg ZVX] d[i]Z i]gZZ nZVgh ^Ac i]Z eZg^AdY ZcYZY Cj cZ 1.* 0.00* ^Ac Xdc[dg b^Ain 1^Ai] N,L, \ZcZgVaan VXXZeiZY VXXdj ci^Ac\ eg^AcX^AeaZh,

 $\begin{array}{l} PZ]VkZ Vahd VjY^iZY^* ^c VXXdgYVcXZ 1^i] i]Z hiVcYVgYh d[i]Z IjWa^X < db eVcn : XXdjci^c \ HkZgh^\]i ; dVgY &Nc^iZY LiViZh' \\ \&I < : H ; '* GZ1h < dgedgVi^dc^h ^ciZgcVa Xdcigda dkZg [^cVcX^Va gZedgi^c \ Vh d[CjcZ1.*0.00* WVhZY dc Xg^iZg^V ZhiVWa^h]ZY ^c BciZgcVa < dcigda+BciZ\gViZY ?gV bZ1dg \ hhjZY Wn i]Z < db b^iiZZ d[Ledchdg^c \ Hg\Vc^oVi^dch d[i]Z MgZVY1Vn < db b^hh^dc &0./1 [gV bZ1dg \ VcY djg gZedgi YViZY : j \jhi /0* 0.00 ZmegZhhZY Vc jcfjVa^[^ZY de^c^dc i]ZgZdc, \end{array}$

6RdZd W`c CaZ_Z`_

$$\begin{split} M]ZhZ \ [^cVcX^Va\ hiViZbZcih\ VgZ\ i]Z\ gZhedch^W^a^hin\ d[\ GZlh\ <dgedgVi^dc~h\ b\ VcV\ZbZci,\ Hjg\ gZhedch^W^a^hin\ ^h\ id\ ZmegZhh\ Vc\ de^c^dc\ dc\ i]Z\ <db\ eVcn~h\ [^cVcX^Va\ hiViZbZcih\ WVhZY\ dc\ djg\ VjY^hh,\ PZ\ VgZ\ V\ ejWa^X\ VXXdjci^c\ [^gb\ gZ\ ^hiZgZY\ l\ ^i]\ i]Z\ I<:H;\ VcY\ VgZ\ gZfj^gZY\ id\ WZ\ ^cYZeZcYZci\ l\ ^i]\ gZheZXi\ id\ i]Z\ <db\ eVcn\ ^c\ VXXdgYVcXZ\ l\ ^i]\ i]Z\ N,L,\ [ZYZgVa\ hZXjg^i^Zh\ aV\ l\ h\ VcY\ i]Z\ Veea^XVWaZ\ gj\ aZh\ VcY\ gZ\ jaZh\ VcY\ i]Z\ I<:H;, \end{split}$$

P Z XdcYjXiZY djg VjY^hih ^c VXXdgYVcXZ 1^hi i] Z hiVcYVgYh d[i]Z I<: H;, M]dhZ hiVcYVgYh gZfj⁶Z i]Vi 1Z eaVc VcY eZg[dg b i]Z VjY^hi dWiV^c gZVhdcVWaZ VhhjgVcXZ VWdji 1]Zi]Zg i]Z [^cCVcX^AVa hiViZbZcih VgZ [gZZ d[b ViZg^AVa b^hhiViZbZci^{*} 1]Zi]Zg YjZ id Zgdg dg [gVjY, Hjg VjY^hih ^cCXajYZY eZg[dg b^c egdXZYjgZh id VhhZhh i]Z g^hh d[b ViZg^AVa b^hhiViZbZci d[i]Z [^cCVcX^AVa hiViZbZcih^{*} 1]Zi]Zg YjZ id Zgdg dg [gVjY^{*} vcY eZg[dg b^c egdXZYjgZh i]Vi gZhedcY id i]dhZ g^hh, LjX] egdXZYjgZh ^cCA₃ yZY ZmV b^cc^{*} dc V iZhi WV^h^{*} Zk⁴YZcXZ gZ \VgY^{*}c^{*} i]Z Vb dj cih VcY Y^hXadhjgZh ^c i]Z [^cCVcX^AVa hiViZbZcih, Hjg VjY^hih Vahd ^cCXajYZY ZkVajVi^{*}c^{*} i]Z VXXdj ci^{*}c^{*} eg⁶CX^eaZh jhZY VcY h^{*}c^{*} i]Z Vb dj cih b VYZ Wn b VcV ZbZci^{*} Vh 1Zaa Vh ZkVajVi^{*}c^{*} i]Z dkZgVaa egZhZciVi^{*}dc d[i]Z [^cCVcX^AVa hiViZbZcih, P Z WZa^{*}ZkZ i]Vi djg VjY^{*}h egdk^{*}YZ V gZVhdcVWaZ WVh^{*}h [dg djg de⁶c^{*}dc,

7 cleITR] 5 fUle A ReeVcd

M]Z Xg^iAXVa VjYAi bViiZgh Xd b b j c^XViZY WZad 1 VgZ bViiZgh Vg^hAc \ [gd b i]Z XjggZci eZg^dY VjYAi d[i]Z [^cVcXAVa hiViZ bZcih i]Vi 1ZgZ Xd b b j c^XViZY dg gZ f j^gZY id WZ Xd b b j c^XViZY id i]Z VjYAi Xd b b'iiZZ VcY i]Vi8 &/ ' gZaViZ id VXXd j cih dg YAAadh j gZh i]Vi VgZ b ViZg^Va id i]Z [^cVcXAVa hiViZ bZcih VcY &0' ^ckdakZY d jg ZheZXAVaan X]VaaZc \^c * hjW_ZXiAkZ* dg Xd b eaZm _jY \ bZcih, M]Z Xd b b j c^XViAd c d[Xg^iAXVa V jYAi bViiZgh YdZh cdi VaiZg ^c Vcn 1 Vn d jg de^cdc dc i]Z [^cVcXAVa hiViZ bZcih* iV^Zc Vh V 1]daZ* VcY 1Z VgZ cdi* Wn Xd b b j c^XViAc \ i]Z Xg^iAXVa V jYAi bViiZgh WZad 1* egdk^Y^c \ hZeVgViZ de^cdch dc i]Z Xg^iAXVa V jYAi bViiZgh dg dc i]Z VXXd j cih dg YAXdh j gZh id 1]^X] i]Zn gZaViZ,

JR]fReZ`_`WX``UhZ]] R_UZ_UVWZ_ZeV']ZgVUZ_eR_XZS]V RddVed

 $4 N \setminus L[RY]RXW X0]QN$ = J]]N[: h gZ[aZXiZY ^c i]Z <d b eVcn~h Xdchda^YViZY [^cVcX^Va hiViZ b Zcih* Vi Cj cZ 1.* 0.00* i]Z <d b eVcn~h \ddY 1 ^aa 1 Vh "3,/5 W^aa^dc VcY ^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhhZih 1 ZgZ "/,. 1 W^aa^dc, : h Y^hXadhZY ^c GdiZ 6 id i]Z Xdchda^YViZY [^cVcX^Va hiViZ b Zcih* \ddY 1 ^aa VcY ^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhhZih VgZ iZhiZY [dg ^b eV^g b Zci Vi aZVhi Vcc j Vaan dg b dgZ [gZf j Zcian ^[^cY^XVidgh d[^b eV^g b Zci gZf j^gZ i]Z eZg[dg b VcXZ d[Vc ^ciZg^ b ^b eV^g b Zci VhhZhh b Zci,

: jYⁱ^c\ bVcV\ZbZci^{*}h ^{*}beV^{*}gbZci iZhih d[\ddY1^{*}aa VcY^{*}cYZ[^{*}cⁱZ!^{*}a^{*}kZY ^{*}ciVc \^WaZ VhhZih 1Vh XdbeaZm VcY]^\]an _jY\bZciVa YjZ id i]Z h^{*}\c^{*}[^{*}XVci bZVhjgZbZci jcXZgiV^{*}cin ^{*}c YZiZgb^{*}c^{*}\ i]Z [V^{*}g kVajZh d[i]Z gZedgi^{*}\ jc^{*}h VcY ^{*}cYZ[^{*}c^{*}iZ+a^{*}kZY ^{*}ciVc \^WaZ VhhZih, Bc eVgi^{*}XjaVg^{*} i]Z [V^{*}g kVajZ Zhi^{*}b ViZh d[i]Z gZedgi^{*}\ jc^{*}h 1ZgZ hZch^{*}i^{*}kZ id X]Vc \Zh ^{*}c h^{*}\c^{*}[^{*}XVci VhhJibei^{*}dch hjX] Vh Y^{*}hXdjci gViZh^{*} ZmeZXiZY [jijgZ XVh] [ad1h^{*} adc +iZgb \gd1i] gViZh VcY XdbeVgVWaZ XdbeVcn ZVgc^{*}c \h b jai^{*}eaZh, M]Z [V^{*}g kVajZ Zhi^{*}b ViZh [dg ^{*}cYZ[^{*}c^{*}iZ+a^{*}kZY ^{*}ciVc \^MWaZ VhhZih 1ZgZ hZch^{*}i^{*}kZ id h^{*}\c^{*}[^{*}XVci Vhhj b ei^{*}dch hjX] Vh Y^{*}hXdjci gViZh^{*} ZmeZXiZY [jijgZ XVh] [ad1h^{*} gdnVain gViZh^{*} VcY iZgb^{*}cVa \gd1i] gViZh, M]ZhZ Vhhj b ei^{*}dch VgZ V[[ZXiZY Wn ZmeZXiZY [jijgZ bVg `Zi dg ZXdcdb^{*}X XdcY^{*}i^{*}dch,

 8X` GN 1MM[N\\NM]QN =J]]N[RW ?^[1^MR] $PZ dWiV^{c}ZY Vc jcYZghiVcY^{c} * ZkVajViZY i]Z YZh^{c} VcY iZhiZY i]Z deZgVi^{c} Z[[ZXi^{k}ZcZhh d[i]Z Xdcigdah dkZg i]Z de Vcn^{h} VXXdjci^{c} [dg i]Z Wjh^{c}Zhh Xd b W^{c}Vi^{d}c, ?dg ZmV b eaZ^{*} 1Z iZhiZY Xdcigdah dkZg i]Z kVajVi^{d}c d[i]Z Xjhid b Zg gZaVi^{d}ch]^{eh} ^{ciVc} WaZ VhhZi^{*}cXajY^{c} b VcV Zb Zci^{h} gZk^{Z} 1 d[i]Z h^{c}C[^{V}Vci Vhhj b ei^{d}ch ^{c} Zhi^{h} b Vi^{c} i]Z [V^{k}g kVajZ d[i]Z Xjhid b Zg gZaVi^{h} b Vi^{c} i]Z [V^{k}g kVajZ d[i]Z Xjhid b Zg gZaVi^{h} b Vi^{c} i]Z [V^{k}g kVajZ d[i]Z Xjhid b Zg gZaVi^{h} ch]^{eh} ^{ciVc} WaZ VhhZi,$

Md iZhi i]Z [V^Ag kVajZ d[i]Z Xjhid bZg gZaVi^Adch]^Aeh ^AciVc \^MaZ VhhZi^{*} djg VjY^Ai egdXZY jgZh ^AcXaj YZY^{*} V b dc \ di]Zgh^{*} VhhZhh^Ac \ bZi]dYdad \^Zh^{*} iZhi^Ac \ i]Z h^A \c^A[^XXvci Vhhj b ei^Adch YZhXg^AWZY VWdkZ^{*} VcY iZhi^Ac \ i]Z Xd b eaZiZcZhh VcY VXX jgVXn d[i]Z jcYZgan^Ac \ YViV jhZY Wn i]Z <d b eVcn, Hjg iZhi^Ac \ egdXZY jgZh dkZg i]Z h^A\c^A[^XXvci Vhhj b ei^Adch ^AcXaj YZY^{*} V b dc \ di]Zgh^{*} Xd b eVg^Ac \ i]Z [jijgZ XVh] [ad 1 h VcY Viig^Ai^Adc gViZ id i]Z]^Ahidg^AXVa gZh jaih d[i]Z VXf j^AgZY Wjh^AcZhh, PZ VhhZhhZY hZch^Ai^A \^An VcVanhZh d[h^A\c^A[^XXvci Vhhj b ei^Adch id ZkVaj ViZ i]Z X]Vc \Zh ^Ac i]Z [V^Ag kVajZ d[i]Z Xj hid bZg gZaVi^Adch]^Aeh ^AciVc \^AWaZ VhZi gZh jai^Ac \ [gd b X]Vc \Zh ^Ac i]Z Vhhj b ei^Adch, PZ Vahd ^AckdakZY Vc ^AciZgcVa kVaj Vi^Ac egd[Zhh^AdcVa id Vhh^Ahi ^Ac ZkVaj Vi^Ac \ i]Z kVaj Vi^Adc bZi]dYdad \ VcY h^Ac^A(XVci Vhhj b ei^Adch jhZY ^Ac i]Z [V^Ag kVajZ Zhi^Ab ViZ,

-h->gchi \$ Rdjc\ EEI PZ]VkZ hZgkZY Vh i]Z <d b eVcn~h VjY^idg h^cXZ 0./0, GZ1 Rdg`* GZ1 Rdg` : j\jhi /0* 0.00

B9KG7CFDCF5H=CB

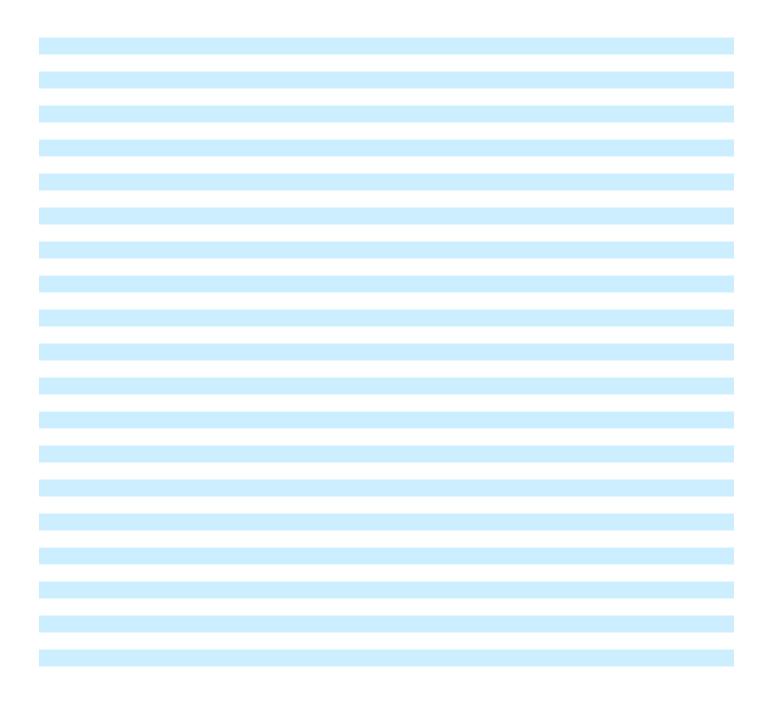
7 CBGC@=8 5H98 GH5H9 A 9BHG C: CD9F5H=CBG #=B A=@@=CBG& 9L79DH D9F G<5F9 5 A C I BHG\$



B9KG7CFDCF5H=CB

B9KG7CFDCF5H=CB

7 CBGC@=8 5H98 6 5 @ 5B 79 G < 99HG #=B A=@@=CBG& 9L 7 9DH G < 5F9 5B8 D9F G < 5F9 5ACIBHG\$



7 CBGC@=8 5H9 8 GH5H9 A 9BHG C: 9E I=HM #=B A=@@=CBG\$

	7]Rdd 7`^^`_	Ge`T\	7`^^`		5 UUZeZ`_R] DRZU'Z_	5TTf ^ f]ReVU	5 TT f ^ f]ReVU CeYVc 7`^acVYV_dZgV	H`eR] BVhd 7`ca`cReZ`_	B`_ T`_ec`]] Z_X	H`eR]
	GYRcVd	5 ^ ` f_e	GYRcVd	5 ^ ` f_e	7 RaZeR]	8 VWZTZe	@`dd	9bf‰j	=_eVcVded	9bflej
; VaVcXZ* CjcZ 1.* 0. /7	164	" 2	0	" 0	" /0*021	" &/*757'	" &/*/04'	" 7*/22	" /*/45	" /.*1//
<j [gd="" ^="" b="" b<br="" evxi="" javi^kz="">VYdei^dc d[cZ l VXXdjci^c∖ hiVcYVgYh</j>	Z	Z	Z	Z	Z	4	1	7	Z	7
GZi adhh	Z	Z	Z	Z	Z	&/*047'	Z	&/*047'	&054'	&/*323'
Hi]Zg Xd b egZ]Zch^kZ adhh	Z	z	Z	z	z	Z	&O.6'	&O.6'	&21'	&03/'
$=^{k}YZcYh$	Z	Z	Z	Z	&//5'	Z	Z	&//5'	&2/'	&/36'
Hi]Zg	1	Z	Z	Z	00	/	Z	01	Z	01
; VaVcXZ* CjcZ 1.* 0.0.	167	2	0	0	/0*/26	&1*02/'	&/*11/'	5*360	6.5	6*167
GZi ^cXd b Z	z	Z	Z	z	z	11.	Z	11.	37	167
Hi]Zg XdbegZ]Zch^kZ ^cXdbZ	Z	Z	Z	Z	Z	Z	17.	17.	56	246
=^k^YZcYh	z	Z	z	z	&//6'	z	z	&//6'	&23'	&/41'
Hi]Zg	0	Z	Z	Z	05	Z	Z	05	14	41
; VaVcXZ* CjcZ 1.* 0.0/	17/	2	0	0	/0*.35	&O*7//'	&72/'	6*0//	713	7*/24
GZi ^cXd b Z	Z	Z	Z	z	Z	401	Z	401	/15	54.
Hi]Zg Xd b egZ]Zch^kZ adhh	Z	Z	Z	Z	Z	Z	&107'	&107'	%75 '	<u>\$204'</u>
$=^{k}YZcYh$	Z	Z	Z	Z	&//6'	Z	Z	&//6'	&35'	&/53'
L]VgZ gZejgX]VhZh	&4 <i>'</i>	Z	&1'	Z	&/56'	&3'	Z	&/61'	Z	&/61'
Hi]Zg	1	Z	Z	Z	/6	Z	Z	/6	1	0/
; VaVcXZ* CjcZ 1 .* 0 . 00	166	2	/75	0	/ /*557	&0*071'	&/*05.'	6*000	70/	7*/21

M]Z VXXd b eVcn^c\ cdiZh VgZ Vc ^ciZ\gVa eVgi d[i]ZhZ Vj Y^iZY Xdchda^YViZY [^cVcX^Va hiViZbZcih,

BCH9 +(89G7F=DH=CB C: 61G=B9GG 5B8 65G=G C: DF9G9BH5H=CB

 $GZ 1 h < dgedgVi^{dc} (i Zi Zg 1^{i})^{h} h jW^{Y^{Q}}Zh^{2} \{GZ 1 h < dgedgVi^{dc} | \{GZ 1 h < dge^{i} i Z \{ < d b eVcn^{*} | \{1Z | dg \{jh|^{h} V \ AdWVa Y^{K}Zgh^{Z} b ZY^{V} VcY ^{c} [dg b Vi^{dc} h Zgk^{X}Zh Xd b eVcn Xd b eg^{h}ZY d[Wjh^{c}ZhhZh VXgdhh V gVc \ Z d[b ZY^{V^{*}}cXaj Y^{c} 8 Y^{h} i Z gVa ZhiViZ hZgk^{X}Zh^{h} jWhXg^{ei}dc k^{Y}Zd hZgk^{X}Zh^{c} : jhigVa^{V*}cZ 1 h VcY ^{c} [dg b Vi^{dc} hZgk^{X}Zh VcY Wd^{ei} , jhigVa^{V*}cZ 1 h VcY ^{c} [dg b Vi^{dc} hZgk^{X}Zh VcY Wd^{ei} , jhigVa^{V*}cZ 1 h VcY ^{c}] h VcY ^{c} [dg b Vi^{dc} hZgk^{A}Zh^{ei} , jhigVa^{V*} , jhigVa^{V*} cZ 1 h VcY ^{c}] h VcY ^{c} [dg b Vi^{dc} hZgk^{A}XZh VcY Wd^{ei} , jhigVa^{V*} , j$

+ARIR NF OQEREMSASINM

 $M]Z VXXd b eVcn^{c} Xdchda^{YViZY} [^{CVCX^{Va} hiViZ b Zcih d[i]Z < d b eVcn^{*} 1]^{X} VgZ gZ[ZggZY id] ZgZ^{c} Vh i]Z {< dchda^{YViZY} ?^{CVCX^{Va} LiViZ b Zcih^{*}] VkZ WZZc egZeVgZY ^{CVXXdgYVcXZ 1^{i}} ZcZgVaan VXXZeiZY VXXdj ci^{c} eg^{X^{a}aZh^{c} i]Z Nc^{i}ZY LiViZh d[: bZg^{XV} &{@:: I|', M]Z < d b eVcn^{h} [^{CVCX^{Va} hiViZ b Zcih Vh d[VcY [dg i]Z [^{hXVa} nZVgh ZcYZY Cj cZ 1.* 0.00^{*} 0.0/ VcY 0.0. VgZ egZhZciZY dc V Xdchda^{YViZY WVh^{h}, }$

M]Z Xdchda^AYViZY hiViZ bZcih d[deZgVi^Adch VgZ gZ[ZggZY id]ZgZ^c Vh i]Z {LiViZ bZcih d[HeZgVi^Adch, | M]Z Xdchda^AYViZY WVaVcXZ h]ZZih VgZ gZ[ZggZY id]ZgZ^c Vh i]Z {; VaVcXZ L]ZZih, | M]Z Xdchda^AYViZY hiViZ bZcih d[XVh] [ad l h VgZ gZ[ZggZY id]ZgZ^c Vh i]Z {LiViZ bZcih d[<Vh] ?ad l h, |

M]Z <d b eVcn b V^ciV^ch V 30+31 1ZZ` [^hXVa nZVg ZcY^ac\ dc i]Z LjcYVn XadhZhi id CjcZ 1. ^c ZVX] nZVg, ?^hXVa 0.00* [^hXVa 0.0/ VcY [^hXVa 0.0. ^cXajYZY 31* 30 VcY 30 1ZZ` h* gZheZXi^kZan, : aa gZ[ZgZcXZh id i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0. gZaViZ id i]Z [^hXVa nZVgh ZcYZY Cjan 1* 0.00* CjcZ 05* 0.0/ VcY CjcZ 06* 0.0.* gZheZXi^kZan, ?dg XdckZc^ZcXZ ejgedhZh* i]Z <d b eVcn Xdci^cjZh id YViZ ^ih Xdchda^YViZY [^cVcX^Va hiViZbZcih Vh d[CjcZ 1.,

BCH9, (GIAA5FMC: G=; B=:=75BH577CIBH=B; DC@=7=9G

9QIMCIOKER NF CNMRNKIDASINM

M]Z <dchda^YViZY ?^cVcX^Va LiViZ b Zcih ^cXa j YZ i]Z VXXd j cih d[Vaa b V_dg^in+d l cZY VcY XdcigdaaZY h j Wh^Y^Vg^Zh, Bc VYY^i^dc* i]Z

, NMCEMSQASINM NF CQEDIS QIR**j**

 $<\!\!db\,eVcn \sim h\,h\,]VgZ\,d[\,i\,]Z^ckZhiZZh^cVgc^c \wedge b\,adhhZh'\,VcY\,i\,]Z <\!\!db\,eVcn \sim h\,LiViZ\,bZcih\,d[\,<\!\!Vh\,]\,?ad\,l\,h\,^cXa\,j\,YZ\,Vaa\,XVh\,]\,gZXZ^kZY\,[gd\,bdg\,eV^Y\,id\,i\,]Z^ckZhiZZ,$

 $M]Z Y^{[[ZgZcXZ WZi 1 ZZc i]Z < d b e V cn~h ~ckZhi b Zci V cY ~ih h] VgZ d[i]Z [V^{g} k VajZ d[i]Z j cYZgan~c cZi iV c VWaZ VhhZih d[i]Z ~ckZhiZZ j edc VXf j ~h^{i} ~ch [~ghi VaadXViZY id Z^{i}]Zg [~c^{i}Z+a^{k}ZY ~ciV c WaZh ~cYZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WaZh dg di]Zg VhZih V cY ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WZ ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WZ ~cVZ[~c^{i}Z+a^{k}ZY ~ciV c WZ ~cVZ[~c^{i}Z+a^{k}ZY ~cVZ[~c^{i}Z+a^{k}ZY ~cVZ[~c^{i}Z+a^{k}ZY ~cVZ[~c^{i}Z+a^{k}ZY ~cVZ[~c^{i}Z+a^{k}ZY ~cVZ[~c^{i}Z+a^{k}ZY ~cVZ[~c^{i}Z+a^{k}Z+a^{k}ZY ~cVZ[~c^{i}Z+a^{k}Z+a$

: XXj b jaViZY di]Zg Xd b egZ]Zch^kZ adhh VgZ gZXd $c^{7}Z r^{1}Z$ LiViZ b Zcih d[HeZgVi^dch 1]Zc i]Z]ZY ZY [dgZXVhiZY igVchVXi^dc ^ b eVXih ^cXd b Z dg ^[i]Z [dgZXVhiZY igVchVXi^dc ^h cd adc Zg ZmeZXiZY id dXXjg,

 $Nedc VYdei^{dc d[: XXdjci^{c} \ LiVcYVgYh NeYViZ \& \{ : LN | `0./5+/0^{c} [^{hXVa 0.0.* i}]Z < db eVcn gZXaVhh^{^{TY "3 b^{aa^{dc ^{c} V^{ch [gd b : XXj b jaViZY YZ[^{X^{i} id : XXj b jaViZY di}]Zg Xd begZ]Zch^{kZ} adhh gZaViZY id V b djcih egZk^{^{j} dj han gZXdgYZY [dg i]Z^{cZ[[ZXi^{kZ b c}]Zch^{^{j} db c}]Zch^{^{j} db c}]}$

BCH9G HC H<9 7 CBGC@=85H98 :=B5B7=5@ GH5H9 A 9BHG

5 EARER

EZVhZh VgZ XaVhh^[^ZY Vh Z^i]Zg [^cVcXZ aZVhZh dg deZgVi^c \ aZVhZh, : aZVhZ ^h XaVhh^[^ZY Vh V [^cVcXZ aZVhZ ^[Vcn dcZ d[i]Z [daad 1 ^c \ Xg'iZg^V VgZ bZi8 i]Z aZVhZ igVch[Zgh d 1 cZgh]^e d[i]Z VhhZi Wn i]Z ZcY d[i]Z aZVhZ iZg b* i]Z aZVhZ XdciV^ch Vc dei^dc id e jgX]VhZ i]Z VhZi i]Vi ^h gZVhdcVWan XZgiV^c id WZ ZmZgX^hZY* i]Z aZVhZ iZg b ^h [dg V b V_dg eVgi d[i]Z gZ b V^c^c \ jhZ[ja a^[Z d[i]Z VhAzi dg i]Z egZhZci kVajZ d[i]Z aZVhZ eVn bZcih ZfjVah dg ZmXZZYh hjWhiVci^Vaan Vaa d[i]Z [V^g kVajZ d[i]Z VhAzi, : aZVhZ ^h XaVhh^[^ZY Vh Vc deZgVi^c \ aZVhZ ^[^i YdZh cdi bZZi Vcn dcZ d[i]ZhZ Xg^iZg^V, M]Z <db eVcn~h deZgVi^c \ aZVhZh eg^b Vg^an Xdch^hi d[gZVa ZhiViZ* ^cXajY^c \ d[[^XZ heVXZ* 1VgZ]djhZ heVXZ VcY eg^ci^c \ [VX^a^iA^Zh* VcY hViZaa^iZ igVchedcYZgh [dg ejgedhZh d[egdk^Y^c \ ^ih hjWhXg^ei^dc k^YZd hZgk^XZh id Xdchj bZgh VcY ^ih [^cVcXZ aZVhZh Xdch^hi d[hViZaa^iZ igVchedcYZgh,

?dg deZgVi^c $zVhZh^* b^c^b j b aZVhZ eVn bZcih^* cXajY^c b^c^b j b hX]ZY jaZY gZci ^cXgZVhZh^* VgZ gZXd c^oZY Vh gZci ZmeZchZ dc V higV^]i+a^cZ WVh^h dkZg i]Z Veea^XVWaZ aZVhZ iZg bh, ?dg [^cVcXZ aZVhZh* aZVhZ ZmeZchZ Xdch^hih d[i]Z YZegZX^Vi^dc d[i]Z g^]i+d[+jhZ VhAZi* Vh 1Zaa Vh ^ciZgZhi ZmeZchZ gZXd c^oZY dc i]Z aZVhZ a^VW^a^in WVhZY dc i]Z Z[[ZXi^kZ ^ciZgZhi bZi]dY jh^c i]Z gViZ ^b ea^XX^i ^c i]Z aZVhZ dg i]Z <db eVcn^h ^cXgZ bZciVa Wdggd 1^c gViZ, : aZVhZh iZg b WZ ^ch dc i]Z YViZ i]Vi i]Z <db eVcn dWiV^ch edhhZhh^dc d[i]Z aZVhZ aZVhZ egZ b^hZh VcY dZh i]gd] i]Z ZmeZXiZY aZVhZ iZg b^cVi^dc YViZ, LZZ GdiZ /. z EZVhZh,$

: NXAKSX ADUAMCER SN ATSHNQR

KdnVain VYkVcXZh VgZ ^c^i^Vaan XVe^iVa^OZY VcY hjWhZf jZcian ZmeZchZY Vh gZaViZY gZkZc jZh VgZ ZVgcZY dg 1]Zc i]Z <dbeVcn YZiZg b^cZh [jijgZ gZXdkZgn ^h cdi egdWVWaZ, M]Z <dbeVcn]Vh V adc \]^hidgn d[egdk^Y^c \ Vji]dgh 1 ^i] gdnVain VYkVcXZh* VcY ^i igVX`h ZVX] VYkVcXZ ZVgcZY 1 ^i] gZheZXi id i]Z hVaZ d[i]Z gZaViZY ejWa^XVi^dc, A^hidg^XVaan* i]Z adc \Zg i]Z jcZVgcZY edgi^dc d[i]Z VYkVcXZ gZ b V^ch djihiVcY^c * i]Z aZhh a^`Zan ^i ^h i]Vi i]Z <dbeVcn 1 ^aa gZXdkZg i]Z VYkVcXZ i]gdj \] i]Z hVaZ d[i]Z ejWa^XVi^dc, M]Z <dbeVcn Veea^Zh i]^h]^hidg^XVa ZmeZg^ZcXZ id ^ih Zm^hi^c \ djihiVcY^c \ gdnVain VYkVcXZh id Zhi^b ViZ i]Z a^`Za^]ddY d[gZXdkZgn VcY V egdk^h^dc ^h ZhiVWa^h]ZY id 1 g^iZ+d[[i]Z jcZVgcZY VYkVcXZ* jhjVaan WZi 1 Zzc /0 VcY 02 bdci]h V[iZg ^c^i^Va ejWa^XVi^dc d[i]Z [^ghi [dg bVi, : YY^i^dcVaan* i]Z <dbeVcn gZk^Z 1 h ^ih edgi[da^d d[gdnVain VYkVcXZh [dg jcejWa^h]ZY i^iaZh id YZiZg b^cZ ^[^cY^k^YjVa gdnVain VYkVcXZh VgZ cdi gZXdkZgVWaZ [dg Y^hXgZiZ gZVhdch* hjX] Vh i]Z YZVi] d[Vc Vji]dg eg^dg id Xd beaZi^dc d[V i^iaZ dg i^iaZh* V <dbeVcn YZX^h^dc id cdi ejWa^h] V i^iaZ* eddg b Vg`Zi YZb VcY dg di]Zg gZaZkVci [VXidgh i]Vi XdjaY ^beVXi gZXdkZgVW^a^in, ; VhZY dc i]^h ^c[dg b Vi^c* i]Z edgi^dc d[Vcn VYkVcXZ i]Vi i]Z <dbeVcn WZa^ZkZh ^h cdi gZXdkZgVWaZ ^h ZmeZchZY,

+TRIMERR , NLBIMASINMR

M]Z ejgX]VhZ eg^XZ d[ZVX] VXfj^h^i/dc ^h Viig^WjiZY id i]Z VhhZih VXfj^gZY VcY a^VW^a^i/Zh Vhhj b ZY WVhZY dc i]Z^g [V^g kVajZh Vi i]Z YViZ d[VXfj^h^i/dc* 1^i] XZgiV^c ZmXZei^dch ^c VXXdgYVcXZ 1^i] @::I, =ZiZg b ^c^c \ i]Z [V^g kVajZ d[VhhZih VXfj^gZY VcY a^VW^a^i/Zh Vhhj b ZY ^ckdakZh i]Z jhZ d[h^c^[^XVci_jY b Zcih* ^cXajY^c \ _jY b Zcih VWdji Veegdeg^ViZ Y^hXdjci gViZh* Viig^i/dc gViZh* gdnVain gViZh VcY [jijgZ XVh] [ad 1 h, M]Z ZmXZhh ejgX]VhZ eg^XZ dkZg i]Z [V^g kVajZ d[cZi iVc \^WaZ VcY ^YZci^[^VWaZ ^ciVc \^WaZ VhhZih VXfj^gZY ^h gZXdgYZY Vh \ddY 1^aa VcY ^h Vhh^\cZY id i]Z gZedgi^c \ jc^i i]Vi ^h ZmeZXiZY id WZcZ[^i [gd b i]Z Wjh^cZhh Xd b W^cVi^dc Vh d[i]Z VXfj^h^i/dc YViZ,

ONNDVIKK AMD IMSAMGIBKE ARRESR

M]Z <d b eVcn]Vh \ddY 1 ^aa VcY ^ciVc \^WaZ VhhZih* ^cXaj Y^c \ igVYZ b Vg`h VcY igVYZcV b Zh* cZ 1 heVeZg b Vhi]ZVYh* ejWa^h]^c \ ^b eg^cih* gVY^d WgdVYXVhi a^XZchZh* ejWa^h]^c \ g^ \]ih VcY Xjhid b Zg gZaVi^dch]^eh, @ddY 1 ^aa ^h gZXdgYZY Vh i]Z Y^[[ZgZcXZ WZi 1 ZZc i]Z Xdhi d[VXfj^g^c \ Zci^i^Zh dg Wjh^cZhhZh VcY V b dj cih Vh^\cZY id i]Z^g iVc \^WaZ VcY ^YZci^[^VWaZ ^ciVc \^WaZ cZi VhhZih, Bc VXXdgYVcXZ 1^i] : L< 13.* i]Z <d b eVcn~h \ddY 1 ^aa VcY ^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhZih VgZ iZhiZY Vccj Vaan Yjg^c \ i]Z [djgi] f j VgiZg [dg ^b eV^g b Zci dg ZVga^Zg ^[ZkZcih dXXjg dg X^gXj b hiVcXZh X]Vc \Z i]Vi 1 djaY b dgZ a^ Zan i]Vc cdi gZYjXZ i]Z [V^g kVajZh WZad 1 i]Z^g XVggn^c \ Vb djcih, BciVc \^WaZ VhhZih 1^i] [^c^iZ a^kZh VgZ V b dgi^oZY dkZg i]Z^g Zhi^b ViZY jhZ[ja a^kZh,

 $\begin{array}{l} Bc \ VXXdgYVcXZ \ 1^{i}] : L < 13.*^{c} \ VhhZhh^{c} \ \ ddY \ 1^{aa} \ [dg \ ^{b} eV^{g} \ ^{b} Zci^{*} \ i]Z \ < db \ eVcn \]Vh \ i]Z \ dei^{dc} \ id \ [^{g} \ eZg[dg \ V \ fjVa^{i}Vi^{k}Z \ VhZhh \ ^{b} Zci^{*} \ i]Z \ < db \ eVcn \]Vh \ i]Z \ dei^{dc} \ id \ [^{g} \ ^{b} \ eZg[dg \ V \ fjVa^{i}Vi^{k}Z \ VhZhh \ ^{c} \ ^{b} \ eZg[dg \ ^{c} \ CZ \ 1]Zi]Zg \ ZkZcih \ dg \ X^{g}Xj \ bhiVcXZh \ Zm^{hi} \ i]Vi \ aZVY \ id \ V \ YZiZg \ b^{c}Vi^{h}dc \ i]Vi \ ^{i} \ ^{h} \ bdgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ [V^{a}g \ kVajZ \ d[\ V \ gZedgi^{c} \ (\ cZh \ i]Vi \ ^{i} \ ^{h} \ bdgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ [V^{a}g \ kVajZ \ d[\ V \ gZedgi^{c} \ (\ cZh \ i]Vi \ ^{i} \ ^{h} \ bdgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ [V^{a}g \ kVajZ \ d[\ V \ gZedgi^{c} \ (\ cZh \ i]Vi \ ^{i} \ ^{h} \ bdgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ (\ cZh \ i]Vi \ ^{i} \ ^{h} \ bdgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ (\ cZh \ i]Vi \ ^{i} \ ^{h} \ bdgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ (\ cZh \ i]Vi \ ^{i} \ ^{h} \ bdgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ (\ cZh \ i]Vi \ ^{i} \ ^{h} \ dgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ cZh \ i]Vi \ ^{i} \ ^{h} \ dgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ cZh \ i]Vi \ ^{i} \ ^{h} \ dgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ cZh \ i]Vi \ ^{i} \ dgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ dgZ \ a^{2}Zan \ i]Vc \ cdi \ i]Vi \ i]Z \ d[\ V \ gZedgi^{c} \ dgZ \ a^{2}Zan \ i]Vc \ cdi \ dgZ \ a^{2}Zan \ i]Vi \ a^{2}Zan \ i]Vc \ cdZ \ a^{2}Zan \ a^{2}Zan \ i]Vc \ cdZ \ a^{2}Zan \ i]Vi \ a^{2}Zan \ a^{2}Zan$

 $[V^{g} kV_{aj}Z d[V gZedgi^{c} j c^{i} h aZhh i] Vc^{i}h XVggn^{c} V b dj ci^{*}i] Z < db eVcn^{h} cdi gZfj^{g}ZY id eZg[dg b Vcn VYY^{i}dcVa iZhih^{c} VhhZhh^{c}] ddY 1^{aa} [dg^{b}eV^{g}bZci, Ad 1 ZkZg^{*}[i] Z < db eVcn XdcXaj YZh di] Zg 1^{h}Z dg ZaZXih cdi id eZg[dg b i] Z fjVa^{i}Vi^{k}Z VhhZhh bZci^{*}i] Zc^{i}h gZfj^{g}ZY id eZg[dg b V fjVci^{i}Vi^{k}Z VcVanh^{h} id YZiZg b^{c}Zi] Z [V^{g}kVajZ d[i] Z gZedgi^{c}] c^{i} VcY Xd beVgZ i] Z$

di]Zg cdc+hZgk^XZ Xdhi Xd b edcZcih d[cZi eZg^dY^X WZcZ[^i &^cXd b Z' Xdhi ^c Hi]Zg* cZi ^c i]Z LiViZ b Zcih d[HeZgVi^dch, LZZ GdiZ /5 z KZi^gZ b Zci ; ZcZ[^i HWa^\Vi^dch,

/AIQ UAKTE LEARTQELEMSR

 $\label{eq:hydrodynamics} hj WhXg^ei^dch hdaY^* VcY i] Z VhhdX^ViZY gViZh X]Vg XJ i] Z Xj hid b Zgh, L^c aZ+Xden gZkZc jZ h gZXd c^oZY Vi V ed^ci c i^b Z dc i] Z YViZ i] Z cZ l h egdY jXih VgZ hdaY id Y^hig^W ji^dc dj iaZih^* cZi d[egdk^h^dch [dg gZaViZY gZi jgch,] gZaViZY gZaViZY gZi jgch,] gZaViZY gZaViZY gZaViZY gZi jgch,] gZaViZY g$

KZkZcjZh [gdb]dbZYZa^kZgn VcY Y^\iVa hjWhXg^ei^dch VgZ gZXd\c^oZY dkZg i]Z hjWhXg^ei^dc iZgb Vh i]Z cZlh egdYjXih VcY-dg Y^\iVa hjWhXg^ei^dch VgZ YZa^kZgZY, Bc[dgbVi^dchZgk^XZh hjWhXg^ei^dcgZkZcjZh VgZ gZXd\c^oZY dkZg i^bZ Vh i]Z hjWhXg^ei^dch VgZ YZa^kZgZY, IVnbZcih [gdb hjWhXg^WZgh VgZ \ZcZgVaan YjZ Vi i]Z WZ\^cc^c \ d[i]Z bdci] VcY VgZ gZXdgYZY Vh YZ[ZggZY gZkZcjZ, LjX]

?]QN[[N_NW^N\

$Hi]Zg\ gZkZc\ jZh\ VgZ\ gZXd\ c^oZY\ 1\]Zc\ i]Z\ gZaViZY\ hZgk^xZh\ VgZ\ eZg[dg\ b\ ZY\ dg\ i]Z\ egdYjXi\]Vh\ WZZc\ YZa^kZgZY,$

3XW][JL]\ `R]Q V^U]RYUN YN[0X[VJWLN XKURPJ]RXW\

M]Z <d b eVcn]Vh XZgiV^c gZkZcjZ XdcigVXih 1]^X] XdciV^c b jai^eaZ eZg[dg b VcXZ dWa^\Vi^dch hjX] Vh eg^ci VcY Y^\^iVa VYkZgi^h^c Wj cYaZh* Y^\^iVa VcY eg^ci cZ l heVeZg hjWhXg^ei^dc Wj cYaZh VcY Wj cYaZY k^YZd hZgk^XZ hjWhXg^ei^dch, KZkZcjZh YZg^kZY [gd b hVaZh XdcigVXih i]Vi XdciV^c b jai^eaZ egdY jXih VcY hZgk^XZh VgZ VaadXViZY WVhZY dc i]Z gZaVi^kZ hiVcYVadcZ hZaa^c \ eg^XZ d[ZVX] eZg[dg b VcXZ dWa^\Vi^dc id WZ YZa^kZgZY, LiVcYVadcZ hZaa^c \ eg^XZ ^h ine^XVaan YZiZg b ^cZY WVhZY dc eg^XZh X] Vg\ZY id Xjhid b Zgh [dg i]Z hV b Z dg h^b^aVg \ddYh dg hZgk^XZh dc V hiVcYVadcZ WVh^h, B[dWhZgkVWaZ hiVcYVadcZ eg^XZh VgZ cdi VkV^aVWaZ* i]Z <d b eVcn Zhi^b ViZh hiVcYVadcZ hZaa^c \ eg^XZ Wn b Vm^b ^o^c \ i]Z jhZ d[dWhZgkVWaZ ^ce jih id b dhi VXXjgViZan gZ[aZXi i]Z eg^XZ d[ZVX] ^cY^kAY j Va eZg[dg b VcXZ dWa^\Vi^dc, KZkZcjZ ^h gZXd \c^OZY Vh ZVX] eZg[dg b VcXZ dWa^\Vi^dc ^cXa jYZY ^c i]Z XdcigVXi ^h hVi^h[^ZY,

9MNW]RORLJ]RXW X0 J L^\]XVN[JWM P[X\\ _N[\^\ WN] [N_NW^N [NLXPWR]RXW

Bc i]Z cdg b Va XdjghZ d[Wjh^cZhh*i]Z <db eVcn VXih Vh dg jhZh Vc ^ciZg b ZY^Vgn dg V\Zci ^c ZmZXji^c\ igVchVXi^dch 1^i] i]^gY eVgi^Zh, P]Zc i]Z ^ciZg b ZY^Vgn dg V\Zci ^h YZiZg b ^cZY id WZ i]Z <db eVcn ~h Xjhid b Zg*i]Z <db eVcn gZXdgYh gZkZc jZ WVhZY dc i]Z Vb dj ci ^i ZmeZXih id gZXZ^kZ [gd b i]Z V\Zci dg ^ciZg b ZY^Vgn,

Bc di]Zg X^agXj b hiVcXZh^{*} i]Z YZiZg b ^cVi^Adc d[1]Zi]Zg gZkZc jZ h]djaY WZ gZedgiZY dc V \gdhh dg cZi WVh^Ah ^A WVhZY dc Vc VhhZhh bZci d[1]Zi]Zg i]Z <d b eVcn ^Ah VXi^Ac \ Wi]Z eg^AcX^AeVa dg Vc V\Zci ^Ac i]Z igVchVXi^Adc, B[i]Z <d b eVcn ^Ah VXi^Ac \ Wi Veg^AcX^AeVa ^Ac V igVchVXi^Adc^{*} i]Z <d b eVcn gZedgih gZkZc jZ dc V \gdhh WVh^Ah, B[i]Z <d b eVcn ^Ah VXi^Ac \ Wi Vc V\Zci ^Ac V igVchVXi^Adc^{*} i]Z <d b eVcn gZedgih gZkZc jZ dc V \gdhh WVh^Ah, B[i]Z <d b eVcn ^Ah VXi^Ac \ Wi Vc V\Zci ^Ac V igVchVXi^Adc^{*} i]Z <d b eVcn ^Ah VXi^Ac \ Wi Vc V\Zci ^Ac V igVchVXi^Adc^{*} i]Z <d b eVcn ^Ah VXi^Ac \ Wi Vc V\Zci ^Ac V igVchVXi^Adc^{*} i]Z <d b eVcn ^Ah VXi^Ac \ Wi Vc V\Zci ^Ac V igVchVXi^Adc^{*} i]Z <d b eVcn ^Ah VXi^Ac \ Wi Vc V\Zci ^Ac V igVchVXi^Adc ^Ac kdakZh _jY \ bZci VcY ^Ah WVhZY dc Vc ZkVaj Vi^Adc d[i]Z iZg bh d[i]Z VggVc \ZbZci, M]Z <d b eVcn hZgkZh Vh i]Z eg^AcX^AeVa ^Ac igVchVXi^Adch ^Ac 1]^AX] ^Ai Xdcigdah i]Z \ddYh dg hZgk^AXZh eg^Adg id WZ^Ac \ igVch[ZggZY id i]Z jai^Ab ViZ Xjhid bZg,

$CJUN \ [N]^{W}$

<ZgiV^c d[i]Z <d b eVcn-h egdY jXih* hjX] Vh Wdd`h VcY cZ l heVeZgh* VgZ hdaY l^i] i]Z g^\]i d[gZijgc, M]Z <d b eVcn gZXdgYh i]Z Zhi^b ViZY ^b eVXi d[hjX] gZijgch Vh V gZY jXi^dc d[gZkZcjZ, Md Zhi^b ViZ egdY jXi hVaZh i]Vi l^aa WZ gZijgcZY VcY i]Z gZaViZY egdY jXih i]Vi VgZ ZmeZXiZY id WZ eaVXZY WVX` ^cid ^ckZcidgn* i]Z <d b eVcn VcVanoZh]^hidg^XVa gZijgch* XjggZci ZXdcd b ^X igZcYh* X]Vc \Zh ^c Xjhid bZg YZ bVcY VcY VXXZeiVcXZ d[i]Z <d b eVcn-h egdY jXih, ;VhZY dc i]^h ^c[dg b Vi^dc* i]Z <d b eVcn gZhZgkZh V eZgXZciV\Z d[ZVX] YdaaVg d[egdY jXi hVaZh i]Vi egdk^YZ i]Z Xjhid bZg l^i] Z

; TBRCQIBEQ ACPTIRISINM CNRSR

<dhih gZaViZY id i]Z VXfj^h^i^dc d[hjWhXg^ei^dc k^YZd hZgk^XZ Xjhid bZgh eg^ b Vg^an Xdch^hi d[V b djcih eV^Y [dg i]^gY+eVgin Xjhid bZg</p>
VXfj^h^i^dch* 1]^X] Xdch^hi d[i]Z Xdhi d[Xd b b^hh^dch eV^Y id Vji]dg^oZY gZiV^aZgh VcY YZVaZgh [dg hjWhXg^WZgh VYYZY i]gdj] i]Z^g
gZheZXi^kZ Y^hig^Wji^dc X]VccZah VcY i]Z Xdhi d[]VgY 1 VgZ VcY ^chiVaaVi^dc hjWhY^Zh [dg hjWhXg^WZgh, : aa Xdhih* ^cXajY^c] VgY 1 VgZ*
^chiVaaVi^dc VcY Xd b b^hh^dch* VgZ ZmeZchZY jedc VXi^kVi^dc* ZmXZei 1]ZgZ aZ \Va d 1 cZgh]^e d[i]Z Zfj^e bZci ^h gZiV^cZY* c 1]^X]
XVhZ i]Z Xdhi d[i]Z Zfj^e bZci VcY Y^gZXi VcY ^cY^gZXi ^chiVaaVi^dc Xdhih VgZ XVe^iVa^oZY VcY YZegZX^ViZY dkZg i]Z gZheZXi^kZ jhZ[ja a^[Z,

*DUEQSIRIMG EWOEMRER

$$\begin{split} M]Z &< d b eVcn ZmeZchZh VYkZgi^h^c \ Xdhih Vh ^cXjggZY ^c VXXdgYVcXZ 1^i] : L < 50.+13* \\ & \{Hi]Zg > meZchZh z : YkZgi^h^c \ < dhi, | : YkZgi^h^c \ VcY egd b di^dcVa ZmeZchZh gZXd \ c^oZY idiVaZY "374 b ^aa^dc* "33. b ^aa^dc VcY "303 b ^aa^dc [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.* gZheZXi^kZan, \end{split}$$

; HIOOIMG AMD HAMDKIMG

<dhih [dg="" \=""]vcya^c="" ^c<="" ^cxjggzy="" gz[azxizy="" h]^ee^c="" th="" vcy="" vgz=""><th>Z V^G Z</th><th>Х</th><th>i</th><th>Ζ</th><th>Y</th><th>i</th><th>] Z</th><th>сҮ</th><th>٨</th><th>c</th></dhih>	Z V^G Z	Х	i	Ζ	Y	i] Z	сҮ	٨	c
--	---------	---	---	---	---	---	-----	----	---	---

: XXj b jaViZY di]Zg Xd b egZ]Zch^kZ adhh, @V^ch VcY adhhZh [gd b [dgZ^\c XjggZcXn igVchVXi^dch VgZ ZcZgVaan cXajYZY c cXd b Z [dg i]Z eZg^dY,

2MCNLE SAWER

BCH9 -(F9J9BI9G

- IRAGGQEGASED QEUEMTE

$B51 \ 7[X^Y \setminus JUN \ X0 = JUJb \setminus RJ \ JWM \ DQJRUJWM \ K^ \setminus RWN \setminus N$

Bc : j \ jhi 0.0/* K> : @gdj e VXf j^gZY Vc /6# ^ciZgZhi &/4,4 # dc V Y^ajiZY WVh^h' ^c IgdeZgin@jgj IiZ, EiY, &{ IgdeZgin@jgj |'* V aZVY^c \ Y^\^iVa egdeZgin iZX] cdad \n Xd b eVcn deZgVi^c \ b Vg`ZieaVXZh ^c Ldji]ZVhi : h^V* ^c ZmX] Vc \ Z [dg Vaa h] VgZh d[K> : @gdj e ~h Zci^i^Zh ^c F VaVnh^V VcY M] V^aVcY, M]Z igVchVXi^dc 1 Vh Xd b eaZiZY V[iZg K> : @gdj e ZciZgZY ^cid Vc V \gZZ b Zci id hZaa ^ih 05 # ^ciZgZhi ^c ^ih Zm^hi^c \ kZcijgZ 1 ^i] 77,Xd, M]Z igVchVXi^dc XgZViZh V aZVY^c \ Y^\^iVa gZVa ZhiViZ hZgk^XZh Xd b eVcn ^c Ldji]ZVhi : h^V* cZ 1 deedgijc^i^Zh [dg XdaaVWdgVi^dc VcY VXXZhh id V YZZeZg edda d[ZmeZgi^hZ* iZX] cdad \n VcY ^ckZhi b Zci ^c i]Z gZ \^dc, K> : @gdj e gZXZ^kZY dcZ hZVi dc i]Z WdVgY d[Y^gZXidgh d[IgdeZgin@jgj Vh eVgi d[i]Z igVchVXi^dc,

 $\begin{array}{l} & Bc \ F \ Vg X \ J \ 0.00^* \ Igde Zgin@jgj \ Xd \ bea ZiZY \ ^ih \ b \ Zg \ Zg \ 1 \ ^i] \ ; g^Y \ Zid \ Ic \ O \ Ada Y^c \ h \ E^b \ ^iZY, \ :h \ V \ gZh \ jai \ d[\ i] Z \ b \ Zg \ Zg \ Vc Y \ h \ WZ \ ^c \ Xdcc \ ZXi^dc \ 1 \ ^i] \ ; g^Y \ VX^i \ dc^* \ K>: \ @gd \ je \ ^h \ d \ 1 \ c \ Zgh \ ^c \ Igde \ Zgin@jgj \ 1 \ Vh \ /5,3 \ \# \ Vc Y \ V^c \ d[\ Veegdm^b \ ViZan \ '' \ SZdg \ Zg' \ CY \ h \ Zdg \ Zg' \ CY \ A \ CY \ V^c \ d[\ Veegdm^b \ ViZan \ '' \ Sdg \ Zdg \ Zg' \ CY \ h \ Sdg \ Zdg \ Zg' \ CY \ h \ Zdg \ Zg' \ Zg' \ CY \ h \ Zdg \ Zg' \ Zg' \ CY \ h \ Zdg \ Zg' \ Zg' \ CY \ h \ Zdg \ Zg' \ Z$

2J\N 3QNVRLJU\

 $Veegdm^b ViZan "/2/ b^aa^dc d[^YZci^[^VWaZ ^ciVc ^WaZ VhhZih* Xdch^hi^c eg^b Vg^an d["/.2 b^aa^dc d[ej Wa^h]^c g^] in [dg WVX`a^hi i^iaZh 1^i] V jhZ[ja a^[Z d[c^cZ nZVgh VcY "10 b^aa^dc d[ej Wa^h]^c a^XZchZh 1^i] V jhZ[ja a^[Z d[c^cZ nZVgh, Bc VXXdg YVcXZ 1^i] : L<13.*i] Z ZmXZhh d[i]Z idiVa Xdch^YZgVi^dc dkZg i]Z [V^g kVajZh d[i]Z cZi iVc ^WaZ VcY ^ciVc ^WaZ VhhZih d[Veegdm^b ViZan "/03 b^aa^dc 1 Vh gZXdg YZY Vh \ddY 1^aa dc i]Z igVchVXi^dc,$

=X[]PJPN 3QXRLN

BCH9G HC H<9 7CBGC@=85H98 :=B5B7=5@ GH5H9A9BHG

BCH9 1(DFCD9FHM& D@5BH 5B8 9E I=DA9BH

	CcZXZ_R] I dVWf]	5d`\;	>f_V -*&
	@ZgVd	,*,,	,*,+
		#Z_ ^	Z]]Z`_d\$
EVcY		"/0.	"/1/
; j^aY^c h VcY aZVhZ]daYh	1 id 3. nZVgh	/*256	/*470
=^\^iVa hZi ide jc^ih VcY ^chiVaaVi^dch	3 id /. nZVgh	/*/.7	/*/3/
F VX]^cZgn VcY Zf j^e b Zci	0 id 0. nZVgh	/*056	/*6.7
<ve^iva^ozy 1="" hd[i="" td="" vgz<=""><td>0 id /3 nZVgh</td><td>/*5.5</td><td>/*410</td></ve^iva^ozy>	0 id /3 nZVgh	/*5.5	/*410
$^{cVcXZ} aZVhZ g^{ }i+d[+jhZ VhhZih$	/3 nZVgh	/02	/16
		3*6/4	4*331
EZhh8 VXXj b jaViZY YZegZX^Vi^dc VcY V b dgi^oVi^dc ^{&V'}		&1*711'	&2*24.'
		/*661	0*.71
<dchigjxi^dc ^c="" egd\gzhh<="" td=""><td></td><td>00.</td><td>/57</td></dchigjxi^dc>		00.	/57
MdiVa IgdeZgin* eaVci VcY Zfj^e bZci* cZi		" 0*/.1	" 0*050

&V' BcXaj YZh VXXj b jaViZY V b dgi^oVi^dc d[XVe^iVa^oZY hd[i l VgZ d[Veegdm^ b ViZan "/*/13 b^aa^dc VcY "/*/.. b^aa^dc Vh d[CjcZ 1.* 0.00 VcY 0.0/* gZheZXi^kZan,

=ZegZX^Vi^dc VcY Vbdgi^oVi^dc gZaViZY id egdeZgin* eaVci VcY Zfj^ebZci 1Vh "326 b^aa^dc* "346 b^aa^dc VcY "315 b^aa^dc [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.* gZheZXi^kZan, M]^h ^cXajYZh Vbdgi^oVi^dc d[XVe^iVa^oZY hd[i1VgZ d["041 b^aa^dc* "03. b^aa^dc VcY "01/ b^aa^dc [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.* gZheZXi^kZan,

$6RaNM 1 \setminus N 9VYJR[VNW]$

 $= jg^{c} \langle i]Z [^{hXVa} nZVg ZcYZY CjcZ 1.* 0.00^{*}i]Z \langle dbeVcn gZXd \langle c^{o}ZY cdc+XVh] ^{b}eV^{a}g bZci X]Vg \langle Zh d["/3 b^{aa^{d}c} gZaViZY id i]Z l g^{i}Z+Yd l c d[[^{mZY} VhhZih VhhdX^{ViZY} 1^{i}]i]Z h]jiYd l c VcY Vci^X^eViZY hVaZ d[XZgiV^{c} N,L, eg^{ci^{c}} \langle VX^{a^{i}}Zh Vi i]Z = d l CdcZh hZ \langle bZci,$

 $= jg^{c} (i)Z [^{h}XVa nZVg ZcYZY CjcZ 1.* 0.0.* i]Z < db eVcn gZXd (c^{o}ZY idiVa [^{m}ZY VhhZi ^{b}eV^{g}bZci X]Vg \Zh d["0.1 b^{aa^{d}c Vi} GZ 1h ND VcY GZ 1h < dge : jhigVa^{V}, : h eVgi d[i]Z < db eVcn adc \+gVc \Z eaVcc^{c} egdXZhh* i]Z < db eVcn gZY jXZY ^{h}d jiadd [dg i]Z N,D, VcY : jhigVa^{V}c cZ 1heVeZgh YjZ id i]Z ^{b}eVXi d[VYkZghZ eg^{c}i VYkZgi^{h}c \ VcY eg^{c}i X^{g}XjaVi^{d}c igZcYh dc i]Z [jijgZ ZmeZXiZY eZg[dg bVcXZ d[i]Z Wjh^{c}Zhh* 1]^{X}] 1ZgZ VXXZaZgViZY Wn i]Z < HOB=+/7 eVcYZ b^{X}, : h V gZhjai* i]Z < db eVcn gZXd (c^{o}ZY cdc+XVh] ^{b}eV^{g}bZci X]Vg \Zh d[Veegdm^{b}ViZan "/26 b^{aa^{d}c}VcY "33 b^{aa^{d}c}gZaViZY id i]Z 1g^{i}Z+Yd 1c d[[^{m}ZY VhhZih Vi ^{i}h N,D, cZ 1heVeZgh VcY : jhigVa^{V}c cZ 1heVeZgh gZedgi^{c} (jc^{h}gZheZXi^{k}Zan, M]Z 1g^{i}Z+Yd 1ch 1ZgZ eg^{b} Vg^{a}an gZaViZY id eg^{c}i h^{i}Zh^{*}eg^{c}i^{c} egZhhZh VcY eg^{c}i gZaViZY Zf j^{e}bZci VcY XVe^{i}Va^{o}ZY hd[i 1VgZ, L^{c}[^{A}XVci jcdWhZgkVWaZ ^{c}jih ji^{a}oZY ^{c} i]Z ^{C}Xd bZ VeegdVX] kVajVi^{d}c bZi]dY [dg GZ 1h ND 1ZgZ V Y^{h}Xdjci gViZ d[7,3 # VcY V adc +iZg b \gd 1i] gViZ d[&/,. ' # VcY [dg GZ 1h : jhigVa^{V} 1ZgZ V Y^{h}Xdjci gViZ d[//,3 # VcY V .,. # adc \ iZg b \gd 1i] gViZ,$

BCH9 2(; CC8 K=@@ 5B8 CH<9F =BH5B ; =6@9 5GG9HG

iZg b \gdli] gViZh &gVc\^c\ [gdb .,. # id 1,. # 'VcY gdnVain gViZh &gVc\^c\ [gdb .,03 # id 4,. # ', L^\c^[^XVci jcdWhZgkVWaZ ^cejih ji^a^oZY ^ci]Z b Vg `Zi VeegdVX] kVajVi^dc bZi]dY 1ZgZ >; BM =: b jai^eaZh [gdb \j^YZa^cZ ejWa^X Xdb eVc^Zh deZgVi^c\ ^ch^b^aVg ^cYjhig^Zh VcY Xdcigda egZ b^j bh &gVc\^c\ [gdb 3,. # id / .,. # ', L^\c^[^XVci ^cXgZVhZh &YZXgZVhZh' ^c gdnVain gViZh* \gdli] gViZh* Xdcigda egZ b^j bh VcY b jai^eaZh* Vhhj b^c\ cd X]Vc\Z ^c Y^hXdj ci gViZh* 1 djaY gZhjai ^c V h^\c^[^XVcian]^\]Zg &ad 1 Zg' [V^g kVajZ bZVhjgZ bZci, L^\c^[^XVci YZXgZVhZh &^CXgZVhZh' ^c Y^hXdj ci gViZh* Vhhj b^c\ cd X]Vc\Z h c gdnVain gViZh* \gdli] gViZh* Xdcigda egZ b^j bh VcY b jai^eaZh* 1 djaY gZhjai ^c V h^\c^[^XVcian]^\]Zg &ad 1 Zg' [V^g kVajZ bZVhjgZ bZci,

//WWSEK) = jg^c \ i]Z i]^gY fjVgiZg d[[^hXVa 0.0.* i]Z <d b eVcn gZXd\c^oZY cdc+XVh] ^ b eV^g b Zci X]Vg\Zh idiVa^c \ "71/ b^aa^dc gZaViZY id i]Z \ddY 1 ^aa VcY ^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhhZih Vi ^ih ?dmiZa gZedgi^c \ jc^i, = jZ id i]Z ^ b eVXi d[VYKZghZ igZcYh gZh jai^c \ [gd b ad 1 Zg ZmeZXiZY WgdVYXVhi hjWhXg^WZgh VcY i]Z ^ b eVXi i]Vi <HOB=+/7 1 Vh ZmeZXiZY id]VkZ dc VYkZgi^h^c * higZV b^c \ VcY Xd b bZgX^Va hjWhXg^WZg gZkZc jZh ^c i]Z cZVg iZg b* i]Z <d b eVcn gZk^hZY ^ih [jijgZ djiad^ 1]^X] gZh jaiZY ^c V gZYjXi^dc ^c ZmeZXiZY [jijgZ XVh] [ad 1 h d[i]Z Wjh^cZhh, :h V gZh jai* i]Z <d b eVcn YZiZg b^cZY i]Vi i]Z [V^g kVa jZ d[i]Z gZedgi^c \ jc^i 1 Vh aZhh i]Vc ^ih XVggn^c \ kVa jZ VcY gZXdgYZY cdc+XVh] ^ b eV^g bZci X]Vg\Zh d["660 b^aa^dc id \ddY 1 ^aa VcY "27 b^aa^dc id ^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhZih, M]Z Vhhj b ei^dch ji^a^OZY ^c i]Z ^cXd bZ VeegdVX] kVa jVi^dc bZi]dY [dg ?dmiZa 1 ZgZ Y^hXdj ci gViZh gVc \c [gd b /.,3 # id //,3 #* V adc\+iZg b \gd 1 i] gViZ d[0,. # VcY V gdnVain gViZ d[/,3 #, M]Z Vhh j b ei^dch ji^a^OZY ^c i]Z b Vg `Zi VeegdVX] kVa jVi^dc bZi]dY 1 ZgZ >; BM= : b jai^eaZh [gd b \ j^YZa^cZ e jWa^X Xd b eVc^Zh deZgVi^c \ ^c h^b^aVg ^cYjhig^Zh VcY V Xdcigda egZ b^j b d[/.,. #,

 $7EVR * LEQICA \ 6AQJESIMG) = jg^c \ i]Z \ i]^gY \ fjVgiZg \ d[[^hXVa 0.0.*i]Z < db eVcn \ gZXd \ c^oZY \ V \ cdc+XVh] \ ^b eV^g \ bZci \ X]Vg \ Z \ d["/53 b^aa^dc \ dc \ i]Z \ Y^hedhVa \ gb i \ i]Z \ gZXaVhh^[^XVi^dc \ d[^ih \ GZ1h \ : \ bZg^XV \ FVg \ Zi^c \ gZedgi^c \ jc^i \ id \ VhZih \]ZaY \ [dg hVaZ, Le^dc \ do \ V \ ^g \ b \ : \ : \ : \ : \ : \ : \ : \ : \ gb \ G \ G \ G \ G \ f'$

g

BCH9 3(6CFFCK=B; G

 $\label{eq:M} M]Z <\!\! d \, b \, eVcn \! \ \ h \, i \, diVa \, Wdggd \, l^c \ \ h \, Xdch^{hi} \, d[\,i\,]Z \, [daad \, l^c \ \ \ \]$

	=_eVcVde cReV Re >f_V -*& ,*,,	A Refclej Re >f_V -*k ,*,,	5d`\\$>f_V-*& ,*,,	5d`\\>f_V-*& ,*,+
			#Z_ ^Z]]Z`_d\$
BVhd 7`ca`cRel`				
0.00 MZg b adVc :	1,307 #	F Vg 1/* 0.05	3	Z
0.00 LZc^dg cdiZh	3,/03 #	?ZW /3*0.10	270	Z
0.0/ LZc^dg cdiZh	1,653 #	FVn /3*0.07	765	763
$\frac{: ieV] ; c fa}{}^{\#R\$}$				
$0.7 < gZY^{i} [VX^a^{in}]$	2,// #	F Vn 1/* 0.02	46	010
0./7 MZg b adVc [VX^a^in	4,03 #	Gdk 00* 0.02	/5/	/7.
$0./5 P dg^{\circ}c \ XVe^{iVa} [VX^a^{im^{4W'}}]$	2,// #	F Vn 1/* 0.02	Z	Z
MZahigV [VX^a^in	6,/4 #	=ZX 00* 0.05	7.	4.
$0./0$ NL eg^kViZ eaVXZ bZci z NL= edgi^dc z igVcX]Z 0^{aX}	2,05 #			

BCH9G HC H<9 7CBGC@=85H98 :=B5B7=5@ GH5H9A9BHG

 $eVnVWaZ^c XVh] hZb^+VccjVaan dc ?ZWgjVgn / 3 VcY : j jhi / 3 d[ZVX] nZVg^* Xdb bZcX^c dc : j jhi / 3^* 0.00, M]Z cdiZh 1^aa bVijgZ dc ?ZWgjVgn / 3^* 0.10,$

M]Z LZc^dg GdiZh VgZ i]Z hZc^dg jchZXjgZY dWa^\Vi^dch d[i]Z <d b eVcn VcY gVc`ZfjVaan ^c g^\]i d[eVn bZci 1^i] i]Z <d b eVcn-h Zm^hi^c \ VcY [jijgZ hZc^dg YZWi* ^cXajY^c \ i]Z di]Zg LZc^dg GdiZh VcY Wdggd 1^c \ h jcYZg ^ih MZg b : VcY KZkdak^c \ ?VX^a^i^Zh &Vh YZ[^cZY WZad 1', M]Z <d b eVcn b Vn gZYZZ b Vaa dg V eVgi d[i]Z LZc^dg GdiZh jedc eVn bZci d[i]Z gZYZ b ei^dc eg^XZh VcY Veea^XVWaZ egZ b^j bh* ^[Vcn* hZi [dgi] ^c i]Z ^cYZcijgZ \dkZgc^c \ i]Z Veea^XVWaZ LZc^dg GdiZh &XdaaZXi^kZan i]Z {BcYZcijgZh} '* eajh Vcn VXXgjZY VcY jceV^Y ^ciZgZhi, Bc VYY^i^dc* Vi Vcn i^bZ eg^dg id heZX^[^ZY YViZh ^c 0.02 VcY 0.03* i]Z <d b eVcn b Vn gZYZZ b je id 2. # d[i]Z V\\gZ\ViZ eg^cX^eVa V bdjci d[i]Z Veea^XVWaZ LZc^dg GdiZh 1^i] i]Z cZi XVh] egdXZZYh d[XZgiV^c Zfj^in d[[Zg^c \ h Vi i]Z gZYZ b ei^dc eg^XZ hZi [dgi] ^c i]Z Veea^XVWaZ BcYZcijgZ* eajh Vcn VXXgjZY VcY jceV^Y ^ciZgZhi, Bc i]Z ZkZci d[heZX^[^ZY X]Vc\Z ^c Xdcigda ZkZcih* i]Z <d b eVcn b jhi d[[Zg id ejgX]VhZ i]Z djihiVcY^c \ LZc^dg GdiZh [gd b i]Z]daYZgh Vi V ejgX]VhZ eg^XZ ZfjVa id / ./ # d[i]Z eg^cX^eVa V bdjci* eajh Vcn VXXgjZY VcY jceV^Y ^ciZgZhi,

 $M]ZgZ VgZ cd [^cVcX^Va bV^ciZcVcXZ XdkZcVcih 1^i] gZheZXi id i]Z LZc^dg GdiZh, M]Z BcYZcijgZh XdciV^c di]Zg XdkZcVcih i]Vi* V b dc \ di]Zg i]^c h VcY hjW_ZXi id XZgiV^c ZmXZei^dch* &^' a^b ^i i]Z < d b eVcn~h VW^a^in VcY i]Z VW^a^in d[^ih hjWh^Y^Vg^Zh id ^cXjg Vcn a^Zch hZXjg^c \ ^cYZWiZYcZhh [dg Wdggd 1 ZY b dcZn VcY &^i a^b^i i]Z < d b eVcn~h VW^a^in id Xdchda^YViZ dg b Zg \Z 1^i] dg ^cid Vcdi]Zg eZghdc dg hZaa dg di]Zg 1^hZ Y^hedhZ d[Vaa dg hjWhiVci^Vaan Vaa d[i]Z VhhZih d[i]Z < d b eVcn VcY ^ih hjWh^Y^Vg^Zh &iV^Zc Vh V 1]daZ',$

DN[V <XJW 1 JWM BN_XU_RWP 3[NMR] 6JLRUR]RN\

 $\begin{array}{l} Hc \ F \ VgX \] \ 07^* \ 0.00^* \ i \]Z \ < db \ eVcn \ iZg \ b^cViZY \ ih \ Zm^hi^c \ jchZX \ jgZY \ "53. \ b^aa^dc \ gZkdak^c \ XgZY^i \ [VX^a^in \ VcY \ ZciZgZY \ cid \ VcZ \ I \ XgZY^i \ V \ gZZ \ bZci \ i \]Z \ \{0.00 \ < gZY^i \ i \ gZZ \ bZci \ i \] \ V \ gZZ \ bZci \ i \]Z \ \{0.00 \ < gZY^i \ i \ gZZ \ bZci \ i \] \ V \ gZZ \ bZci \ i \]Z \ VX^a^in \ ki \]Z \ \{MZg \ b \ : \ PVX^a^in \ VcY \ I \ ZgZ \ bZci \ V \ ZgZ \ bZci \ VX^a^in \ ki \]Z \ \{MZg \ b \ : \ PVX^a^in \ VcY \ i \ ZgZ \ VX^a^in \ VcY \ I \ ZgZ \ bZci \ VcY \ V \ S3. \ b^aa^dc \ jchZX \ jgZY \ XgZY^i \ [VX^a^in \ VcY \ ZgZ \ Ada \ ZXi^kZan \ gZ[ZggZY \ id \ Vh \ \{MZg \ b \ : \ PVX^a^in \ VgZ \ Xdaa \ ZXi^kZan \ gZ[ZggZY \ id \ Vh \ \{MZg \ b \ : \ PVX^a^in \ VgZ \ Xdaa \ ZXi^kZan \ gZ[ZggZY \ id \ Vh \ \{MZg \ b \ : \ PVX^a^in \ VgZ \ Xdaa \ ZXi^kZan \ gZ[ZggZY \ id \ Vh \ \{MZg \ b \ : \ PVX^a^in \ VgZ \ Xdaa \ ZXi^kZan \ gZ[ZggZY \ id \ Vh \ \{MZg \ b \ : \ PVX^a^in \ VgZ \ Xdaa \ ZXi^kZan \ gZ[ZggZY \ id \ Vh \ \{MZg \ b \ : \ PVX^a^in \ VcY \ V \ S3. \ b^aa^dc \ jchZX \ jgZY \ gZkdak^c \ XgZY^i \ [VX^a^in \ ki] \ Z \ \{KZkdak^c \ PVX^a^in \ VcY \ id \ Zi \ Zgg \ Xdaa \ ZXi^kZan \ gZ[ZggZY \ id \ Vh \ MZg \ BZ \ SZGg \ ZZgg \ ZZgg$

M]Z MZg b : EdVch 1 ^aa V b dgi^oZ ^c ZfjVa fjVgiZgan ^chiVaa b Zcih ^c Vc V\\gZ\ViZ VccjVa V b djci ZfjVa id ... #* 0,3 #* 0,3 #* 3,. # VcY 3,. #* gZheZXi^kZan* d[i]Z dg^\^cVa eg^cX^eVa V b djci d[i]Z MZg b : ?VX^a^in [dg ZVX] /0+b dci] eZg^dY Xd b bZcX^c \ dc CjcZ 1.* 0.00, M]Z adVch jcYZg i]Z KZkdak^c \ ?VX^a'in 1 ^aa cdi V b dgi^oZ, : aa djihiVcY^c \ V b djcih jcYZg i]Z 0.00 <gZY^i : \gZZ b Zci 1^i] gZheZXi id i]Z ?VX^a^i/zh VgZ YjZ dc F VgX] 1/* 0.05* jcaZhh ZVga^Zg iZg b^cViZY ^c i]Z X^gXj bhiVcXZh hZi [dgi] ^c i]Z 0.00 <gZY^i : \gZZ b Zci, M]Z <db eVcn b Vn gZfjZhi i]Vi i]Z b Vijg^in YViZ d[i]Z MZg b : ?VX^a^in WZ ZmiZcYZY jcYZg XZgiV^c X^gXj bhiVcXZh Vh hZi [dgi] ^c i]Z 0.00 <gZY^i : \gZZ b Zci Wn Vi aZVhi dcZ nZVg, M]Z <d b eVcn b Vn Vahd gZfjZhi i]Vi i]Z b Vijg^in YViZ d[i]Z gZkdak^c \ XgZY^i Xd b b^i b Zcih jcYZg i]Z KZkdak^c \ ?VX^a^in WZ ZmiZcYZY jcYZg XZgiV^c X^gXj bhiVcXZh Vh hZi [dgi] ^c i]Z 0.00 <gZY^i : \gZZ bZci [dg je id i 1 d VYY^i^cCVa dcZ+nZVg eZg^dYh,

 $\begin{array}{l} & \text{BciZgZhi dc Wdgd 1^c h ^h WVhZY dc 2^i]Zg \&V' Vc : aiZgcVi^kZ < jggZcXn MZg b KViZ [dg b jaV* \&W' V MZg b LH?K [dg b jaV* &X' Vc : aiZgcVi^kZ < jggZcXn = V^an KViZ [dg b jaV &&V' i]gd j] &X' ZVX]* V {KZaZkVci KViZ |' dg &Y' i]Z ; VhZ KViZ [dg b jaV* ZVX] Vh hZi [dgi] ^c i]Z 0.00 < gZY^i : \gZZ b Zci, M]Z Veea^XVWaZ b Vg \c [dg Wdggd 1^c h j cYZg i]Z ?VX^a^i^Zh VcY i]Z Xd b b^i b Zci [ZZ [dg j cYgV 1 c WVaVcXZh j cYZg i]Z KZkdak^c \ ?VX^a^in VgZ WVhZY dc i]Z eg^X^c \ \g^Y ^c i]Z 0.00 < gZY^i : \gZZ b Zci * 1]^X] &Vg^Zh WVhZY dc i]Z eg^X^c \ \g^Y ^c i]Z 0.00 < gZY^i : \gZZ b Zci * 1]^X] &Vg^Zh WVhZY dc i]Z < d b eVcn^h VY_j hiZY deZgVi^c \ ^cXd b Z czi aZkZgV \Z gVi^d, : i Cj cZ 1.* 0.00* i]Z < d b eVcn 1 Vh eVn^c \ Xd b b^i b Zci [ZZ hd [.,0. # dc Vcn j cYgV 1 c WVaVcXZ j cYZg i]Z KZkdak^c \ ?VX^a^in VcY * 1^i] gZheZXi id Vcn djihiVcY^c \ Wdggd 1^c h j cYZg i]Z ?VX^a^i^Zh Vc Vce a^XVWaZ b Vg \c d[.,153 # [dg V ; VhZ KViZ Wdggd 1^c \ VcY /,153 # [dg V KZaZkVci KViZ Wdggd 1^c \, M]Z < d b eVcn ZciZgZY ^cid Vc ^ciZgZhi gViZ h 1 Ve YZg^kVi^kZ id [^m i]Z [adVi^c \ gViZ ^ciZgZhi Xd b edcZci d[^ih MZg b : EdVch Vi 0, .61 #, KZ[Zg id GdiZ // z ?^cVcX^Va Bchig b Zcih VcY ?V^g OVa ZF ZVh jgZ b Zcih [dg [ji]Zg YZiV^a, \\ \end{array}$

 $M]Z < db eVcn Wdggd 1 ZY i]Z [jaa V b dj ci d[i]Z MZg b : ?VX^a^in dc F VgX] 1/* 0.00 VcY]VY cdi Wdggd 1 ZY Vcn [jcYh jcYZg i]Z KZkdak^c ?VX^a^in Vh d[CjcZ 1.* 0.00,]VX^a^in Vh d[CjcZ 1$

M]Z 0.00 <gZY^Ai : \gZZ bZci XdciV^Ach XZgiV^Ac Xjhid b Vgn V[[^ag b Vi^AKZ VcY cZ\Vi^AKZ XdkZcVcih VcY ZkZcih d[YZ[Vjai 1^Ai] Xjhid b Vgn ZmXZei^Adch^{*}^AcXaj Y^Ac \ ^a^b ⁱVi^Adch dc i]Z VW^a^Ain d[i]Z <d b e^Vcn VcY i]Z <d b e^Vcn^Ah j^{Wh}Y^AVg^AZh id Zc \V Z^Ac igVchVXi^Adch 1^Ai] V[[^aAViZh^{*} ^AcXjg a^AZch^{*} bZg\Z ^Acid dg Xdchda^AYViZ 1^Ai] Vcn di]Zg Zci^Ain^{*} ^AcXjg hj^{Wh}Y^AVgn YZWi dg Y^AhedhZ d[Vaa dg hj^{Wh}Vci^AVaan Vaa d[ⁱI^A Vh^AZh iV^AZc Vh V 1] daZ, Bc VYY^Ai^Adc^{*} i]Z 0.00 <gZY^Ai : \gZZ bZci gZf j^AgZh i]Z <d b e^Vcn id b^Vci^Vc Vc VY_jhiZY deZgVi^Ac \ ^aCXd bZ cZi aZkZgV\Z gVi^Ad d[cdi b dgZ i]^Vc 1, id /, * hj^WZXi id XZgi^Vc VY_jhi bZcih [daad 1^Ac \ V b ViZg^AVa VXf j^Ah^Ai^Ac^{*} Vc V cZi ^aciZgZhi XdkZgV\Z gVi^Ad d[cdi aZhh i]^Vc 1, id /, .*

/NWSEK OQNTO +NQQNVIMGR

 $M]Z ?dmiZa @gdje]Vh Wdggd 1^c h jcYZg i]Z [daad 1^c [VX^a^i^Zh^* Vh 1Zaa Vh djihiVcY^c N,L, eg^kViZ eaVXZ bZci hZc^dg jchZX jgZY cdiZh8]$

- u : c : "4/. b^aa^dc 0./7 gZkdak^c \ XgZY^i [VX^a^in VcY : "2. b^aa^dc 0./5 l dg`^c \ XVe^iVa [VX^a^in, ; dgd l^c h jcYZg i]ZhZ [VX^a^i^Zh WZVg ^ciZgZhi Vi V [adVi^c gViZ d[i]Z : jhigVa^Vc ; ; LR eajh Vc Veea^XVWaZ b Vg \^c d[WZi l ZZc 0, . . # VcY 1,03 # eZg Vcc j b* YZeZcY^c \ dc i]Z ?dmiZa = ZWi @gd je ~h cZi aZkZgV \Z gVi^d, M]Z ?dmiZa = ZWi @gd je eVnh V Xd b b^i bZci [ZZ d[23 # d[i]Z Veea^XVWaZ b Vg \^c [dg Vcn jcYgV l c V b d jcih jcYZg i]ZhZ [VX^a^i^Azh,
- u : [jaan YgV1c : "O3. b^aa^dc iZg b adVc [VX^a^in, ; dggd1^c h jcYZg i]^h [VX^a^in WZVg ciZgZhi Vi V [^mZY gViZ d[4,03 # eZg

BCH9G HC H<9 7 CBGC@=85H98 :=B5B7=5@ GH5H9A9BHG

1 V^kZY* Vcn jceV^Y V bdjcih jcYZg i]Z Veea^XVWaZ YZWi V\gZZ bZcih bVn WZ YZXaVgZY ^b bZY^ViZan YjZ VcY eVnVWaZ, M]Z <dbeVcn 1 Vh ^c Xd bea^VcXZ 1^i] Vaa hjX] XdkZcVcih Vi CjcZ 1.* 0.00,

: fefcV ^ RefcZeZVd

 $M]Z [daad l^c \ iVWaZ hj b b Vg^oZh i]Z < d b eVcn~h YZWi b Vijg^i^Zh^* ZmXajY^c \ YZWi ^hhjVcXZ Xdhih VcY [^cVcXZ aZVhZ a^VW^a^i^Zh^* Vh d[CjcZ 1.*0.008]$

	5d`\\>f_V -*k ,*,,
	#Z_ ^Z]]Z`_d\$
?^hXVa 0.01	" 05/
?^hXVa 0.02	6/
?^hXVa 0.03	4.0
?^hXVa 0.04	11
?^hXVa 0.05	23.
M]ZgZV[iZg	/*37.

BCH9 +*(@95G9G

 $\begin{array}{l} Hc \ Cjan \ /^{*} \ 0. \ / \ 7^{*} \ i] Z < d \ b \ eV cn \ VY dei ZY \ : LN \ 0. \ / \ 4^{+} . \ 0 \ dc \ V \ b \ dY^{[^{Z}Y \ gZigdheZXi^{k}Z \ WVh^{h} \ VcY \ gZXd \ c^{o}ZY \ V \ " \ 7 \ b^{aa^{A}dc \ Xj \ b \ jaVi^{k}Z^{+} \ Z[[ZXi \ VY_{j}h \ b \ Zci \ id \ i] Z \ deZc^{c} \ WVaVcXZ \ d[\ : XXj \ b \ jaViZY \ YZ[^{X^{i}} \ gZaViZY \ id \ egZk^{A}djh \ hVaZ \ aZVhZWVX^{` igVchVXi^{A}dch, \ AVAVcXZ \ d[\ : XXj \ b \ jaViZY \ YZ[^{X^{i}} \ gZaViZY \ id \ egZk^{A}djh \ hVaZ \ aZVhZWVX^{` igVchVXi^{A}dch, \ AVAVcXZ \ d[\ : XXj \ b \ jaViZY \ YZ[^{X^{i}} \ gZaViZY \ id \ egZk^{A}djh \ hVaZ \ aZVhZWVX^{` igVchVXi^{A}dch, \ AVAVcXZ \ d[\ : XXj \ b \ jaViZY \ YZ[^{X^{i}} \ gZaViZY \ id \ egZk^{A}djh \ hVaZ \ aZVhZWVX^{` igVchVXi^{A}dch, \ AVAVcXZ \ d[\ : XXj \ b \ jaViZY \ YZ[^{X^{i}} \ gZaViZY \ id \ egZk^{A}djh \ hVaZ \ aZVhZWVX^{` igVchVXi^{A}dch, \ AVAVcXZ \ d[\ : XXj \ b \ jaViZY \ YZ[^{X^{i}} \ gZaViZY \ id \ egZk^{A}djh \ hVaZ \ aZVhZWVX^{` igVchVXi^{A}dch, \ AVAVcXZ \ d[\ : XXj \ b \ gZXVLX \ igVcX^{i} \ deZVhZWVX^{` igVc} \ deZVLX^{i} \ deZVLX \ deZVLX \ deZVLX^{i} \ deZVL$

$C^VVJ[b X0 UNJ N]$

 $M]Z < d b eVcnth deZgVi^{c} aZVhZh eg^{b} Vg^{an} Xdch^{hi} d[gZVa ZhiViZ^{*}cXajY^{c} d[[^{XZ} heVXZ^{*} 1 VgZ]djhZ heVXZ VcY eg^{ci^{c}} [VX^{a^{i}Zh^{*}} VcY hViZaa^{i}Z igVchedcYZgh, = jg^{c} i]Z [djgi] fjVgiZg d[[^{hXVa} 0.0.^{*}i]Z < d b eVcn b dY^{[^{ZY} hi} XdcigVXi gZaViZY id^{h} hViZaa^{i}Z igVchedcYZgh 1]^{X}] gZhjaiZY ^{c} XZgiV^{c} igVchedcYZgh WZ^{c} XaVhh^{[^{ZY} Vh} [^{c}VcXZ aZVhZh, <ZgiV^{c} aZVhZh [dg hViZaa^{i}Z igVchedcYZgh 1]^{X}] gZhjaiZY ^{c} XZgiV^{c} igVchedcYZgh WZ^{c} XaVhh^{[^{ZY} Vh} [^{c}VcXZ aZVhZh, <ZgiV^{c} aZVhZh [dg hViZaa^{i}Z igVchedcYZgh 1]^{Z}gZYZiZg b^{c}ZY id WZ deZgVi^{c} aZVhZh ^{c} VXXdgYVcXZ 1^{i}] : LN 0./4+.0, M]Z < d b eVcn^{h} deZgVi^{c} aZVhZh |ZcZgVaan^{c}XajYZ dei^{d}ch id ZmiZcY i]Z aZVhZ iZg b dg iZg b^{c}ViZ i]Z aZVhZ, LjX] dei^{d}ch Yd cdi^{b}eVXi i]Z < d b eVcn^{h} aZVhZ iZg b VhhZhh bZci j ci^{a} i]Z < d b eVcn^{h} gZVhdcVWan XZgiV^{c} i]Vi i]Z dei^{d}c 1^{aa} WZ ZmZgX^{h}ZY,$

<ZgiV^c d[i]Z <d b eVcn⁻h aZVhZh ^cXaj YZ gZci VY_jhi bZcih 1]^X] bVn WZ ^cYZmZY id kVg^djh bZig^xXh^{*} ^cXaj Y^c i]Z Xdchj bZg eg^xXZ ^cYZm dg di]Zg ^c[aVi^ddcVgn ^cYZmZh, : h V \ZcZgVa bViiZg^{*} i]Z <d b eVcn⁻h gZVa ZhiViZ aZVhZ VggVc \ZbZcih ine^xXaan gZf j^gZ VY_jhi bZcih gZh jai^c [gd b X]Vc \Zh ^c gZVa ZhiViZ iVmZh VcY di]Zg Xdhih id deZgViZ i]Z aZVhZY VhZi,

?]QN[[NZ^R[NM UNJ\N MR\LUX\^[N\

M]Z idiVa aZVhZ Xdhi [dg deZgVi[^]c \ VcY [[^]cVcXZ aZVhZh [^]cXajYZY [^]c i]Z LiViZbZcih d[HeZgVi[^]dch 1 Vh Vh [daad 1 h8

	:`c eYV WZdTR] jVRcd V_UVU >f_V -*&					
	,*,,			,*,+		,*,*
=_T` ^ V GeReV ^ V_e @`TRel`_		#Z_ ^	Z]]Z`_d\$			
LZaa^c * \ZcZgVa VcY VY b ^c^higVi^kZ	"	/03	"	/13	"	/17
HeZgVi^c \ ZmeZchZh		14		15		42
=ZegZX^Vi^dc VcY Vbdgi^oVi^dc		05		05		4
BciZgZhi ZmeZchZ* cZi		1		2		/
HeZgVi^c \ ZmeZchZh		/0		/3		7
LZaa^c * \ZcZgVa VcY VY b ^c^higVi^kZ		02		06		2/
	"	005	"	024	"	04.
	LZaa ^A c* \ZcZgVa VcY VY b ^A c ^A higVi ^A kZ HeZgVi ^A c \ ZmeZchZh =ZegZX ^A Vi ^A dc VcY V b dgi ^A OVi ^A dc BciZgZhi ZmeZchZ [*] cZi HeZgVi ^A c \ ZmeZchZh	LZaa^c * \ZcZgVa VcY VY b ^c^higVi^kZ " HeZgVi^c \ ZmeZchZh =ZegZX^Vi^dc VcY Vb dgi^oVi^dc BciZgZhi ZmeZchZ* cZi HeZgVi^c \ ZmeZchZh LZaa^c * \ZcZgVa VcY VY b ^c^higVi^kZ				

$: YY^{i} dc Va \ c[dg \ b \ Vi^{d} c \ gZa ViZY \ id \ i \]Z < d \ b \ eV cn-h \ deZg Vi^{c} \ VcY \ [^{c} VcXZ \ aZVhZh \ j \ cYZg \ : LN \ 0. \ / 4+. \ 08$

	5 d `\V >f_V	-***,*,,	5d`\V>f_V	-** ,* ,+
	CaVcReI_X @VRdVd	: Z_R_TV @VRdVd	CaVcReZ_X @VRdVd	: Z_R_TV @VRdVd
$PZ^{ } Z^{ }] iZY+VkZgV Z gZ b V^{c^{c} } aZVhZ iZg b$	//,. nZVgh	0,6 nZVgh	//,6 nZVgh	1,5 nZVgh
P Z^\]iZY+VkZgV\Z ^cXgZ b ZciVa Wdggd 1 ^c \ gViZ	1,34 #	1,42 #	1,32 #	1,42 #
		:`c	eYV WZdTR] jVRcd V_	_UVU >f_V -*&
			,*,,	,*,+
			#Z_ ^ Z]]Z`_	d\$
$<$ Vh] eV^Y + HeZgVi^c \ aZVhZ a^VW^a^i^Zh		"	/60 "	/62

<Vh] eV^Y + ?^cVcXZ aZVhZ a^VW^a^i^Zh + eg^cX^eVa

8VclgRelgV =_decf ^V_ed

 $M]Z < db eVcn ^h Y^{g}ZXian VcY ^cY^{g}ZXian V[[ZXiZY Wn g^h`h VhhdX^ViZY 1^i] X]Vc \ Zh ^c XZgiV^c b Vg`Zi XdcY^i^dch, P]Zc YZZ b ZY Veegdeg^ViZ* i]Z < db eVcn jhZh YZg^kVi^kZ ^chigj b Zcih id b^i^\ViZ i]Z ediZci^Va ^b eVXi d[i]ZhZ b Vg`Zi g^h`h, M]Z eg^b Vgn b Vg`Zi g^h`h b VcV \ ZY Wn i]Z < db eVcn i]gdj] i]Z jhZ d[YZg^kVi^kZ ^chigj b Zcih ^cXaj YZ8$

 $\label{eq:linear} u \qquad [dgZ^{\wedge} c XjggZcXn ZmX]Vc^{Z}gViZg^{h^{8}} Vg^{h^{c}} eg^{b}Vg^{an}i]gdj^{]}?dmiZa=ZWi@gdjeWdggd1^{c}h YZcdb^{c}ViZY^{c}N,L, \\ \label{eq:linear}$

 $M]Z [daad 1^c \ hZih [dgi] i]Z Z[[ZXi d[[V^g kVajZ]ZY \ c \ gZaVi^dch]^eh dc]ZY \ ZY \ iZbh^c i]Z ; VaVcXZ L]ZZih Vh d[CjcZ 1.*0.00 VcY 0.0/8$

		5d`\V>f_V -*&		
		,*,,	,*,+	
; dggd 1 ^c \h8		#Z_ ^ Z]]Z`_d\$	\$	
<vggn^c \="" ^izb<="" td="" vbdjcid[]zy\zy=""><td>"</td><td>46 "</td><td>5/</td></vggn^c>	"	46 "	5/	
<j]z=""]zy\^c\="" ^c="" ^cxaj="" b="" c="" d="" i="" i<="" j="" javi^kz="" td="" v="" vy_jhi="" xvggn^c\="" yzy="" zcih=""><td></td><td>0</td><td>3</td></j>		0	3	

B`_cVTfccl_X : Rlc JR]fV A VRdfcV ^ V_ed

Bc VYY^i^dc id VhhZih VcY a^VW^a^i^Zh i]Vi VgZ gZ bZVhjgZY Vi [V[^]g kVajZ dc V gZXjgg^c \ WVh^h* i]Z <d beVcn]Vh XZgiV^c VhhZih* eg^ bVg^an \ddY 1^aa* ^ciVc \^WaZ VhhZih* Zfj^in bZi]dY ^ckZhi bZcih VcY egdeZgin* eaVci VcY Zfj^e bZci* i]Vi VgZ cdi gZfj^gZY id WZ gZ bZVhjgZY id [V[^]g kVajZ Vi i]Z ZcY d[ZVX] gZedgi^c \ eZg^dY, Hc Vc dc \d^c \ WVh^h* i]Z <d beVcn bdc^idgh 1]Zi]Zg ZkZcih dXXjg dg X^gXj bhiVcXZh X]Vc \Z i]Vi 1djaY bdgZ a^ Zan i]Vc cdi gZYjXZ i]Z [V[^]g kVajZh d[i]ZhZ VhhZih WZad1 i]Z[^]g XVggn^c \ Vbdjcih, B[i]Z <d beVcn YZiZg b^cZh i]Vi i]ZhZ VhhZih VgZ ^b eV^gZY* i]Z <d beVcn 1djaY 1g^iZ Yd1c i]ZhZ VhhZih id [V[^]g kVajZ, M]ZhZ cdcgZXjgg^c \ [V[^]g kVajZ bZvhjgZbZcih VgZ Xdch^YZgZY id WZ EZkZa 1 ^c i]Z [V[^]g kVajZ]^ZgVgX]n,

= jg^c \ i]Z [djgi] fjVgiZg d[[^hXVa 0.0.* i]Z <dbeVcn gZXd\c^oZY cdc+XVh] ^beV^g bZci X]Vg\Zh d["0.1 b^aa^dc gZaViZY id [^mZY VhhZih ^c i]Z N,D, VcY : jhigVa^V, M]Z XVggn^c \ kVajZh d[egdeZgin* eaVci VcY Zfj^e bZci hjWhZfjZci id i]Z ^beV^g bZci X]Vg\Zh Vi i]Z : jhigVa^Vc VcY N,D, cZlheVeZgh gZedgi^c \ jc^ih 1ZgZ "013 b^aa^dc VcY "0.5 b^aa^dc* gZheZXi^kZan, LZZ GdiZ 5 z IgdeZgin* IaVci VcY >fj^e bZci,

= jg^c \ i]Z i]^gY fjVgiZg d[[^hXVa 0.0.* i]Z <d beVcn gZXd\c^oZY cdc+XVh] ^beV^g bZci X]Vg\Zh d["660 b^aa^dc VcY "27 b^aa^dc gZaViZY id \ddY 1^aa VcY ^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhhZih* gZheZXi^kZan* Vi ^ih ?dmiZa gZedgi^c \ jc^i, M]Z XVggn^c \ kVajZ d[\ddY 1^aa Vi ?dmiZa YZXgZVhZY [gd b "/*446 b^aa^dc id "564 b^aa^dc VcY i]Z kVajZ d[^cYZ[^c^iZ+a^kZY ^ciVc \^WaZ VhhZih YZXgZVhZY [gd b "/67 b^aa^dc id "/2. b^aa^dc, LZZ GdiZ 6 z @ddY 1^aa VcY Hi]Zg BciVc \^WaZ :hhZih,

= jg^c \ i]Z [^ghi f jVgiZg d[[^hXVa 0.0.* i]Z < db eVcn gZXd \c^oZY cdc+XVh] ^b eV^g bZci X]Vg \Zh d["/00 b^aa^dc VcY "//1 b^aa^dc gZaViZY id \ddY 1^aa VcY ^cYZ[^c^iZ+a^kZY ^ciVc \%aZ VhhZih* gZheZXi^kZan* Vi i]Z GZ1h : bZg^XV F Vg^Zi^c \ gZedgi^c \ jc^i, M]Z XVggn^c \ kVajZ d[\ddY 1^aa Vi GZ1h : bZg^XV F Vg^Zi^c \ YZXgZVhZY [gdb "/00 b^aa^dc id c^a VcY i]Z kVajZ d[^cYZ[^c^iZ+a^kZY ^ciVc \%aZ VhhZih* gZheZXi^kZan* ciVc \%aZ VhhZih YZXgZVhZY [gdb "1.6 b^aa^dc id "/73 b^aa^dc, LZZ GdiZ 6 z @ddY 1^aa VcY Hi]Zg BciVc \%aZ : hhZih,

CeYVc :RZc JR]fV AVRdfcV^V_ed

: h d[Cj cZ 1.* 0.00G]Z XVggn^c $kVajZ d[i]Z < db ddZan; hZZjihiVcY^c Wdggd 1^c h Veegdm^b ViZh i]Z [V^g kVajZ, M]Z 0.00 LZc^dg GdiZh* 0.0/ LZc^dg GdiZh VcY N,L, eg^kViZ eaVXZbZci Wdggd 1^c h VgZ XaVhh^[^ZY Vh EZkZa 0 VcY i]Z gZ b V^c^c Wdggd 1^c h VgZ XaVhh^[^ZY Vh EZkZa 1 ^c i]Z [V^g kVajZ]^2gVgX]n,$

BCH9+,

 $4 R_RMNWM \setminus e$

L]VgZh|'* dg 1 djaY ^cXgZVhZ i]Z F ?M-h kdi^c\ ed 1 Zg Wn bdgZ i]Vc /,53 # ^c Vcn gdaa^c\ i1ZakZ+bdci] eZg^dY, M]Z F ?M 1 djaY [dg[Z^i kdiZh ^c XdccZXi^dc 1^i] Vc VccjVa dg heZX^Va <d b eVcn hidX`]daYZgh bZZi^c\ id i]Z ZmiZci cZXZhhVgn id ZchjgZ i]Vi i]Z F ?M VcY i]Z F jgYdX] [Vb^an XdaaZXi^kZan Yd cdi ZmXZZY 22 # d[i]Z djihiVcY^c\ kdi^c\ ed 1 Zg d[i]Z <aVhh ; L]VgZh Vi hjX] bZZi^c* ZmXZei 1]ZgZ V F jgYdX] [Vb^an bZ bWZg kdiZh i]Z^g d 1 c h]VgZh Y^[[ZgZcian [gd b i]Z F ?M dc Vcn bViiZg, M]Z LidX`]daYZgh : \gZZ bZci 1^aa iZg b^cViZ jedc i]Z F ?M-h Y^hig^Wji^dc d[Vaa dg hjWhiVci^Vaan Vaa d[^ih <aVhh ; L]VgZh,

BCH9 +-(9EI=HM'65G98 7CAD9BG5H=CB

> b eadnZZh* =^gZXidgh VcY di]Zg hZgk^XZ egdk^YZgh d[i]Z <d b eVcn &{eVgi^X^eVcih|' VgZ Za^\^WaZ id eVgi^X^eViZ ^c i]Z GZ1 h <dgedgVi^dc 0./1 Edc\+MZg b &cXZci^kZ IaVc &Vh V bZcYZY VcY gZhiViZY* i]Z {0./1 EMBI |'* 1]^X] egdk^YZh [dg Zfj^in+WVhZY Xd b eZchVi^dc ^cXaj Y^c\ eZg[dg b VcXZ hidX` jc^ih &{ILNh|'* gZhig^XiZY hidX` jc^ih &{KLNh|' VcY di]Zg ineZh d[V1 VgYh, M]Z <d b eVcn]Vh i]Z VW^a^in id V1 VgY je id 3. b^aa^dc h]VgZh d[<aVhh : <d b bdc LidX` jcYZg i]Z iZg bh d[i]Z 0./1 EMBI, : aa h]VgZh d[<aVhh : <d b bdc LidX` gZhZgkZY [dg XVcXZaaZY dg [dg[Z^iZY Zfj^in+WVhZY Xd b eZchVi^dc V1 VgYh jcYZg i]Z 0./1 EMBI WZXd bZ VkV^aVWaZ [dg [jijgZ \gVcih,

M]Z [daad l^c\ iVWaZ hj b bVg^oZh i]Z <d b eVcn-h Zf j^in+WVhZY Xd b eZchVi^dc ZmeZchZ gZedgiZY ^c i]Z LiViZ bZcih d[HeZgVi^dch8

		:`c eYV \\ZdTR] j\Rcd V_UVU >f_V -*&					
	,	*,,		,*,+		,*,*	
			#Z_ *	^ Z]]Z`_d\$			
MdiVa Zfj^in XdbeZchVi^dc ZmeZchZ	"	37	"	/06	"	47	

:hd[CjcZ1.*0.00

BCH9G HC H<9 7CBGC@=85H98 :=B5B7=5@ GH5H9A9BHG

?dg [^hXVa 0.0.* ^cXajYZh .,2 b^aa^dc d[iVg\Zi ILNh VcY .,5 b^aa^dc KLNh XVcXZaaZY VcY V eVndji VY_jhibZci d[.,2 b^aa^dc ILNh YjZ id i]Z VXijVa eZg[dg b VcXZ aZkZa VX]^ZkZY [dg ILNh \gVciZY ^c [^hXVa 0./5 i]Vi kZhiZY Yjg^c \ [^hXVa 0.0.,

BCH9 +.(95FB=B; G #@CGG\$ D9F G<5F9

 $M]Z [daad l^c \ iVWaZh hZi [dgi] i]Z Xd b e j iVi^dc d[WVh^X VcY Y^a j iZY ZVgc^c \ h \&adhh' eZg h]VgZ j cYZg : L < 04.* {>Vgc^c \ h eZg L]VgZ|8 }$

	:`c eYV WZdTR] jVRcd V_UVU >f_V -*&					
		,*,,	,*,+			,*,*
		#Z_ ^ Z]]Z`_	_d& Vi7	Vae aVc dYRcV	R ^ ` f	f_ed\$
GZi ^cXd b Z &adhh'	"	54.	"	167	"	&/*323'
EZhh8 GZi &^cXd b Z' adhh Viig^Wj iVWaZ id cdcXdcigdaa^c \ ^ciZgZhih		&/15'		&37'		054
GZi ^cXd b Z &adhh' Viig^WjiVWaZ id GZ l h <dgedgvi^dc hidx`]dayzgh<="" td=""><td>"</td><td>401</td><td>"</td><td>11.</td><td>"</td><td>&/*047'</td></dgedgvi^dc>	"	401	"	11.	"	&/*047'
$PZ^{\ }JiZY+VkZgV\ z\ bWZg\ d[\ h]VgZh\ d[\ Xd\ b\ dc\ hidX^ djihiVcY^c\ z\ WVh^X$		367,3		37.,2		365,7
$=^{a}ji^{k}Z Z[ZXi d[Zfj^{i} V V V V]$		1,.		1,.		Z
$\label{eq:powerserver} P Z^{\ } iZY + VkZgV \ Z \ c \ j \ b \ WZg \ d[\ h] \ VgZh \ d[\ Xd \ b \ dc \ hidX \ d \ j \ ihiVcY^{\ }c \ \ z \ Y^{\ }a \ j \ iZY$		370,3		371,2		365,7
$GZi \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	"	/,.4	"	.,34	"	&0,/4'
GZi ^cXd b Z &adhh' Viig^WjiVWaZ id GZ l h <dgedgvi^dc +<br=""]dayzgh="" ezg="" h]vgz="" hidx`="">Y^ajiZY</dgedgvi^dc>	"	/,.3	"	.,34	"	&0,/4'

&V' M]Z Y^aji^kZ ^ b eVXi d[i]Z <d b eVcn~h ILNh* KLNh VcY hidX` dei^dch]Vh WZZc ZmXajYZY [gd b i]Z XVaXjaVi^dc d[Y^ajiZY adhh eZg h]VgZ [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.0. WZXVjhZ i]Z^g ^cXajh^dc 1 djaY]VkZ Vc Vci^Y^aji^kZ Z[[ZXi dc i]Z cZi adhh eZg h]VgZ,</p>

BCH9 +/(F9@5H98 D5FHM HF5BG57H=CBG

: EKASED 9AQSX <QAMRACSINMR

Bc i]Z dgY^cVgn XdjghZ d[Wjh^cZhh*i]Z <dbeVcn ZciZgh ^cid igVchVXi^dch 1^i] gZaViZY eVgi^Zh id ejgX]VhZ VcY-dg hZaa VYkZgi^h^c \ VcY VY b^c^higVi^kZ hZgk^XZh, M]Z <dbeVcn]Vh Vahd egZk^djhan ZciZgZY ^cid igVchVXi^dch 1^i] gZaViZY eVgi^Zh id hZaa XZgiV^c WgdVYXVhi g^]ih,

M]Z [daad l ^c\ iVWaZ hZih [dgi] i]Z cZi gZkZc jZ [gd b gZaViZY eVgi^Zh ^cXaj YZY ^c i]Z LiViZ bZcih d[HeZgVi^dch8

		:`	c eYV WZ	/dTR] jVI	Rcd V_UVU >f	_V -*&	
		,*,,		,	*,+	,*	,*
				#1_ ^	Z]]Z`_d\$		
KZaViZY eVgin gZkZcjZ &ZmeZchZ'* cZi	"		&/.'	"	&13'	"	&47'

M]Z [daad l^c\ iVWaZ hZih [dgi] i]Z V b dj ci d[gZXZ^kVWaZh YjZ [gd b VcY eVnVWaZh YjZ id gZaViZY eVgi^Zh djihiVcY^c\ dc i]Z ; VaVcXZ L]ZZih8

		5d`\\>f_V -*å	
		,*,, ,	*,+
		#Z_ ^ Z]]Z`_d\$	
: XXdjcih gZXZ^kVWaZ [gdb gZaViZY eVgi^Zh	"	/2 "	6
: XXdjcih eVnVWaZ id gZaViZY eVgi^Zh		1.	0

BCH9 +0(7 C A A=HA 9BHG 5 B 8 7 CBH=B; 9B7=9G

, NLLISLEMSR

 $M]Z < db eVcn]Vh Xdb b^ibZcih jcYZg XZgiV^c [^gb XdcigVXijVa VggVc \ZbZcih & {[^gb Xdb b^ibZcih|' id bV^Z [jijgZ eVn bZcih, M]ZhZ [^gb Xdb b^ibZcih hZXjgZ i]Z XjggZci VcY [jijgZ g^\]ih id kVg^djh VhhZih VcY hZgk^XZh id WZ jhZY ^c i]Z cdg bVa XdjghZ d[deZgVi^dch, M]Z [daad l^c \ iVWaZ hj b bVg^oZh i]Z < db eVcn^h bViZg^Va [^gb Xdb b^ibZcih Vh d[CjcZ 1.*0.008]]]$

	5d`\#>f_V-*k,*,,				
	DRj^V_ed 8 fV Sj DVcZ`U				
	H`eR]	@Vdd eYR_ + jVRc	+'- jVRcd	-'/ jVRcd	A`cV eYR_ / jVRcd
			#Z_ ^ Z]]Z`_d\$		
$I jgX]VhZ dWa^{Vi^{dCh}}$	" 71.	" 247	" 106	" 47	" 42
Ledgih egd\gV b b^c\ g^{N}]ih ^{&W'}	/*5.6	24.	573	16/	50
$I gd gV b b^c Xdhih^{\&X'}$	346	040	050	1.	2
$HeZgVi^{c} \setminus aZVhZh^{kY'}$					
MgVch b ^hh^dc Xdhih ^{∦Z′}	/5.	04	24	13	41
$EVcY VcY Wj^aY^c h$	/*/04	/17	023	0/5	303
I aVci VcY bVX]^cZgn	//	3	3	/	Z
?^cVcXZ aZVhZh					
MgVch b ^hh^dc Xdhih ^{∦Z′}	5.	07	2/	Z	Z
; dggd $1^c h^{\ell'}$	1*.05	05/	461	261	/*37.
BciZgZhi eVn b Zcih dc Wdggd l ^c \h&\'	5/.	//6	0.4	/55	0.7
MdiVa Xd b b^i bZcih VcY XdcigVXi j Va dWa^\Vi^dch	" 6*10.			"	

 $gZVhdcVWaZ edhh^W^a^in i]Vi V adhh bVn WZ^cXjggZY*i]Z < dbeVcn 1Vh jcVWaZ id Zhi^bViZ i]Z Vbdjci d[adhh dg gVc \ Z d[adhh, M]Z < dbeVcn gZXd \ c^oZh \ V^c Xdci^c \ ZcX^Zh 1]Z \ V^c WZXd bZh gZVa^oZY dg gZVa^oVWaZ,$

$>N \geq 1 VN[RLJ = J[TN]RWP$

 $Bc FVn 0.0.*i]Z < db eVcn hdaY ^{ih} GZ 1h : bZg^{XV} FVg^{Zi^{c}} Wjh^{c}Zhh, Bc i]Z = ^{hedh^{i^{d}c^{*}}i]Z < db eVcn gZiV^{c}ZY XZgiV^{c} a^{VW^{a^{i^{2}}h^{c}} (gd b i]Z aZ Va egdXZZY^{c} h 1^{i} Bch^{c^{V}} VcY OVaVhh^{h} YZhXg^{WZY WZad 1},$

9W\RPWRJ Cb\]NV\% 9WL'

 $\begin{array}{l} & Bc \ Cjan \ 0.\ /7^* \ Bch^c^V \ [^aZY \ V \ Xd \ b \ eaV^ci \ ^c \ i] Z \ N,L, \ =^hig^Xi \ <djgi \ [dg \ i] Z \ =^hig^Xi \ d[\ F^ccZhdiV \ V\ V^chi \ GZ1h \ : \ bZg^XV \ F\ Vg^Zi^c\ ?LB \ E,E,<, \ \&\{G: \ F \ PLB|'^* \ GZ1h \ : \ bZg^XV \ F\ Vg^Zi^c\ Bc+LidgZ \ LZgk^XZh \ E,E,<, \ \&\{G: \ F \ Bc+LidgZ|' \ VcY \ GZ1h \ <dgedgVi^dc \ \&id\ Zi\]Zg^* \ i] Z \ \{G: \ F \ IVgi^Zh|' \ VaZ\ C\ k^daVi^dch \ d[\ [ZYZgVa \ VcY \ HVIZ \ Vci^igjhi \ aV \ Ih \ VcY \ Xd \ b \ bd \ aV \ I \ Wjh^cZhh \ idgih, \ M]Z \ Xd \ be aV^ci \ hdj\]i \ igZWaZ \ YV \ bV\ Zh^* \ c_j \ cXi^kZ \ gZa^Z[\ VcY \ VidgcZh^- \ [ZZh \ VcY \ Xdhih, \ Bc \ Cjan \ 0.\ O0^* \ i] Z \ eVgi^Zh \ V\ gZZY \ id \ hZiaZ \ i] Za^i^i\ Vi^dc \ VcY \ Bch^cV^h \ hZy \ I^i] \ egZ_j \ Y^XZ, \end{array}$

FJUJ\\R\ 3XVV^WRLJ]RXW\% 9WL'

8 J[YN[3XUURW\

; $Z c^c c \ c \ 2Wgj Vgn 0.0/* V cj b WZg d[ejgedgiZY XaVhh VXi^dc Xd b eaV^cih] VkZ WZZc [^aZY ^c i]Z G, R, =^hig^Xi <djgi V V^chi : b Vodc, Xd b * BcX, &{ : b Vodc | ' VcY XZgiV^c ej Wa^h] Zgh* ^cXaj Y^c \ i]Z <d b eVcn~h hj Wh^Y^Vgn* AVgeZg <daa^ch IjWa^h] Zgh* E, E, <, &{AVgeZg < daa^ch | VcY id Zi] Zg 1^i] i]Z di] Zg ej Wa^h] Zgh* i]Z {IjWa^h} Zgh* i]Z {IjWa^h} Zgh 'c \ k^daVi^dch d[Vci^igjhi VcY Xd b eZi^i^c aV 1 h, M]Z Xd b eaV^ch hZZ `igZWaZ YV b V \Zh* ^c_j cXi^kZ gZa^Z[VcY ViidgcZnh~ [ZZh VcY Xdhih, Bc LZeiZ b WZg 0.0/* : b Vodc VcY i]Z$

: XXj b jaViZY eZch^Adc WZcZ[^Ai dWa^A\Vi^Adch Vh d[Cj cZ 1.* 0.00 VcY 0.0/ 1ZgZ "/*.// b^Aaa^Adc VcY "/*235 b^Aaa^Adc* gZheZXi^AkZan, ; Zad 1 ^Ah ^Ac[dg b Vi^Adc VWdji [jcYZY VcY jc[jcYZY eZch^Adc eaVch⁸

					8`^	VdeZT DV_	.dZ`_ 6V	VWZed				
	: f_UVU D]R_d				I_Wf_UVU D]R_d				H`eR]			
	5 d ` W > f			f_V -*&								
		,*,,		,*,+	,	,*,,	,*:	,+		,*,,		,*,+
						#Z_ ^ Z]]]Z`_d\$					
Igd_ZXiZY WZcZ[^i dWa^\Vi^dc	"	031	"	11.	"	5	"	7	"	04.	"	117
: XXj b jaViZY WZcZ[^i dWa^\Vi^dc		031		11.		5		7		04.		117
?V^g kVajZ d[eaVc VhhZih		00.		063		Z		Z		00.		063

					DV	_dZ`_	6V_	VWZed																
			8`	^ VdeZT						cVIX_ `c eYV	WZd'I	[R] jVR	cd V_		6V_	ZcV ^ ` VWZed - *&	V_e				H	`eR]		
	,*	, ,	,	*,+	,'	*,*	,	*,,	,	*,+		*,* #1_^1			,'	ʻ , +	,	*,*	,	,*,,	,'	[*] ,+	,*	,*
LZgk^XZ Xdhi WZcZ[^ih ZVgcZY Yjg^c\ i]Z eZg^dY	"	z	"	z	"	z	"	/	"	0	.,	0	"	z	"	Z	"	z	"	/	"	0	"	0
BciZgZhi Xdhih dc egd_ZXiZY WZcZ[^i dWa^\Vi^dch		5		5		//		/5		/4		0.		/		0		1		03		03		12
>meZXiZY gZijgc dc eaVc VhhZih	8	k/3'		&/1'		&/4'		&14'		&15'		å21'												

B9KG7CFDCF5H=CB

BCH9G HC H<9 7 CBGC@=85H98 :=B5B7=5@ GH5H9A9BHG

M]Z iVWaZ WZad 1 hZih [dgi] V hj b b Vgn d[X]Vc\Zh ^c i]Z [V^g kVajZ d[^ckZhi b Zcih gZ[aZXiZY Vh EZkZa 1 VhhZih Vh d[Cj cZ 1.*0.00 VcY 0.0/8

		e ^ V_ed
; VaVcXZ* Cj cZ 1.* 0.0.	#L_ ^ L	/]]Z`_d\$ 7
: XijVa gZijgc dc eaVc VhhZih8		
KZaVi^c \ id VhhZih hi^aa]ZaY Vi ZcY d[eZg^dY		/
KZaVi^c \ id VhhZih hdaY Yjg^c \ i]Z eZg^dY		Z
I jgX]VhZh* hVaZh* hZiiaZ b Zcih VcY ^hh j VcXZh		Z
MgVch[Zgh ^c VcY dji d[EZkZa 1		Z
; VaVcXZ* CjcZ 1.* 0.0/	"	1.
: XijVa gZijgc dc eaVc VhhZih8		
KZaVi^c \ id VhhZih hi^aa]ZaY Vi ZcY d[eZg^dY		åΟ'
$KZaVi^c \ id VhhZih hdaY Yjg^c \ i]Z eZg^dY$		z
I jgX]VhZh* hVaZh* hZiiaZ b Zcih VcY ^hh j VcXZh		&/'
MgVch[Zgh ^c VcY dji d[EZkZa 1		Z
; VaVcXZ* CjcZ 1.* 0.00	"	5

 $M]Z < d b e V cn h ckZhi b Z ci higViZ n [dg ^ih e Z ch^d c eaVch ^h id b Vm^b ^oZ i]Z adc +iZg b gViZ d[gZijgc dc eaVc VhhZih 1^i]^c V c VXXZeiVWaZ aZkZa d[g^h ^ c dgYZg id b^c^b^oZ i]Z Xdhi d[egdk^Yc eZch^d c WZcZ[^ih 1]^aZ b V^ciV^c^c VYZfjViZ [jcY^c aZkZah, M]Z < d b e V cn h egVXi^XZ ^h id XdcYjXi V eZg^dY^X higViZ ^X gZk^Z 1 d[^ih VhhZi VaadXVi^d c, M]Z < d b e V cn h XjggZci WgdVY higViZ ^X iVg Zii]VkZ V eZch^d c VhZi edgi[da^d Xd b eg^hZY d[/5 # Zfj^in hZXjg^i^Zh^ 54 # [^mZY ^cXd b Z hZXjg^i^Zh VcY 5 # ^c XVh] VcY di]Zg ^ckZhi b Zcih, Bc YZkZade^c i]Z ZmeZXiZY adc +iZg b gViZ d[gZijgc*i]Z < d b e V cn Xdch^YZgZY i]Z eZch^d c VhhZi edgi[da^d - h eVhi VkZgV Z gViZ d[gZijgch VcY [jijgZ gZijgc ZmeZXiVi^d ch d[i]Z kVg^djh VhhZi XaVhhZh, : edgi^d cd [i]Z di]Zg VaadXVi^d c ^h gZhZgkZY ^c XVh] id egdk^YZ [dg ZmeZXiZY WZcZ[^ih id WZ eV^Y ^c i]Z h]dgi iZg b, M]Z < d b eVcn^h Zfj^in edgi[da^d h VgZ b VcV ZY ^c hjX] V 1 Vn Vh id VX]^ZkZ dei^ b Va Y^kZgh^in, M]Z < d b eVcn^h [^mZY ^cXd b Z edgi[da^d ^h ^ckZhi b Zci \gVYZ ^c i]Z V\\gZ \ViZ, M]Z < d b eVcn YdZh cdi b VcV Z Vcn VhhZih ^ciZgcVaan,$

 $M]Z <\!\! d \, b \, eVcn \sim h \, WZcZ[^i \, eaVc \, 1 \, Z^{\ }] \, iZY + VkZgV \setminus Z \, VhhZi \, VaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, Wn \, VhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, [daad \, 1 \, h8] \, KaadXVi^dch^* \, VgZ \, Vh \, (daad \, 1 \, h8] \, KaadXVi^dch^* \, VgZ \, Vh \, (daad \, 1 \, h8] \, KaadXVi^dch^* \, VgZ \, Vh \, VhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, (daad \, 1 \, h8] \, KaadXVi^dch^* \, VhZi \, VhZi \, VhZi \, Vh \, VhZi \, XViZ \setminus dgn^* \, VgZ \, Vh \, (daad \, 1 \, h8] \, VhZi \, XViZ \setminus dgn^* \, VhZi \, VZi \, VhZi \, VZi \, VhZi \, VhZi \, VhZi \, VZi \, VhZi \, VZi \, VhZi \, VZi \,$

	DV_dZ`_	5 ddVed
	5d`W>	f_V -*&
	,*,,	,*,+
5ddVe 7ReVX`cj4		
>fj^in hZXjg^i^Zh	/3 #	/7 #
$=$ ZWi hZX j g^i^Zh	53 #	51 #
<vh] di]zg<="" td="" vcy=""><td>/. #</td><td>6 #</td></vh]>	/. #	6 #
MdiVa	/ #	/ #

 $\begin{array}{l} KZfj^{g}ZY \ eZch^{d}c \ eaVc \ Xdcig^{W}ji^{d}ch \ [dg \ i]Z \ cZmi \ [^{h}XVa \ nZVg \ VgZ \ ZmeZXiZY \ id \ WZ \ Veegdm^{b}ViZan \ "/O \ b^{aa^{d}c9} \]d \ IZkZg^{*} \ VXijVa \ Xdcig^{W}ji^{d}ch \ b \ Vn \ WZ \ V[[ZXiZY \ Wn \ eZch^{d}c \ VhZi \ VcY \ a^{VW^{a}n} \ kVajVi^{d}c \ X]Vc \ Zh \ Yjg^{c} \ i]Z \ nZVg, \ M]Z \ <dbeVcn \ 1^{aa} \ Xdci^{c}jZ \ id \ b \ V^{2} \ Xdcig^{W}ji^{d}ch \ VhZi \ VcY \ a^{VW^{a}n} \ kVajVi^{d}c \ X]Vc \ Yjg^{c} \ i]Z \ nZVg, \ M]Z \ <dbeVcn \ 1^{aa} \ Xdci^{c}jZ \ id \ b \ V^{2} \ Xdcig^{W}ji^{d}ch \ Vh \ cZXZhVgn \ id \ b \ vdY \ VcY \ V$

BCH9 +2(CH<9F DCGHF9H=F9A9BH 69B9 := HG

- EFIMED , NMSQIBTSINM 9KAMR

M]Z <d b eVcn]Vh YZ[^cZY Xdcig^Wji^dc eaVch [dg i]Z WZcZ[^i d[hjWhiVci^Vaan Vaa Z b eadnZZh bZZi^c XZgiV^c Za^\^W^a^in gZfj^gZ bZcih, > b eadnZg Xdcig^Wji^dch id hjX] eaVch 1ZgZ "/25 b^aa^dc* "/20 b^aa^dc VcY "/32 b^aa^dc [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.* gZheZXi^kZan,

- EFEQQED , NLOEMRASINM 9KAM

M]Z <d b eVcn]Vh cdc+f jVa^[^ZY YZ[ZggZY Xd b eZchVi^dc eaVch [dg i]Z WZcZ[^i d[XZgiV^c b VcV\Zb Zci Zb eadnZZh, M]Z ^ckZhi b Zci [j cYh d[[ZgZY id i]Z eVgi^X^eVch \ZcZgVaan XdggZhedcY id i]Z [j cYh d[[ZgZY ^c i]Z <d b eVcn~h 2./&`' eaVc* VcY i]Z VXXd j ci WVaVcXZ [ajXijViZh 1^i] i]Z ^ckZhi b Zci gZi jgch dc i]dhZ [j cYh, M]Z jc[j cYZY dWa^\Vi^dch d[i]Z eaVch ^cXaj YZY ^c Hi]Zg a^VW^a^i^Zh Vh d[Cj cZ 1.* 0.00 VcY 0.0/ 1ZgZ "26 b^aa^dc VcY "3/ b^aa^dc* gZheZXi^kZan* VcY i]Z bV_dg^in d[i]ZhZ eaVch VgZ XadhZY id cZ 1 Zb eadnZZh,

BCH9 +3(=**B7CA9H5L9**G

BcXdbZ iVmZh VgZ gZXd\c^oZY [dg i]Z Vbdjci d[iVmZh eVnVWaZ [dg i]Z XjggZci nZVg VcY [dg i]Z ^b eVXi d[YZ[ZggZY iVm VhhZih VcY a^VW^a^irZh* 1]^X] gZegZhZci [jijgZ iVm XdchZfjZcXZh d[ZkZcih i]Vi]VkZ WZZc gZXd\c^oZY Y^[[ZgZcian ^c i]Z [^cVcX^Va hiViZ bZcih i]Vc

M]Z gZXdcX^a^Vi^dc WZi1ZZc i]Z <d b eVcn~h VXijVa Z[[ZXi^kZ iVm gViZ VcY i]Z hiVijidgn N,L, ?ZYZgVa ^cXd b Z iVm gViZ 1Vh Vh [daad 1 h8



 $\label{eq:main_optimal_states} M]Z h^{\c} (^{XVci} Xd b edcZcih d[i]Z < d b eVcn~h YZ[ZggZY iVm VhhZih VcY a^VW^a^iA^Zh 1ZgZ Vh [daad 1 h8]) \\$



: jhigVa^Vc GHEh d["1/ b^aa^dc i]Vi VgZ b dgZ a^ Zan i]Vc cdi id WZ gZVa^oZY, ?dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.0/* i]Z <d b eVcn gZaZVhZY kVajVi^dc Vaad I VcXZh gZaViZY id N,L, ?ZYZgVa GHEh d["42 b^aa^dc i]Vi VgZ b dgZ a^ Zan i]Vc cdi id WZ gZVa^oZY,

: h d[Cj cZ 1.* 0.00* i]Z <d b eVcn]VY Veegdm^h b ViZan "0,3 W^haa^hdc VcY "/,3 W^haa^hdc d[XVe^hiVa adhh XVggn[dg 1 VgYh ^hc : jhigVa^hV VcY i]Z N,D,* gZheZXi^hkZan, : jhigVa^hV VcY N,D, XVe^hiVa adhh XVggn[dg 1 VgYh b Vn WZ XVgg^hZY [dg 1 VgY ^hcYZ[^hc^hiZan, M]Z XVe^hiVa adhh XVggn[dg 1 VgYh VgZ Vahd hjW_ZXi id gZk^hZ 1 Wn gZaZkVci iVm Vji]dg^hiZh ^hc i]Z _jg^hY^hXi^hdch id 1]^hX] i]Zn gZaViZ, KZVa^hOVi^hdc d[djg

<dbeVcn Z[[ZXi^kZan hZiiaZY ^ih BciZgcVa KZkZcjZ LZgk^XZ VjY^i gZaViZY id i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0./2 ^c ?ZWgjVgn 0.0. 1^i] cd bViZg^Va X]Vc\Zh, M]Z <dbeVcn WZa^ZkZh ^i]Vh Veegdeg^ViZan VXXgjZY [dg i]Z ZmeZXiZY djiXdbZ d[jcXZgiV^c iVm bViiZgh VcY WZa^ZkZh hjX] a^VW^a^iZh gZegZhZci V gZVhdcVWaZ egdk^h^dc [dg iVmZh jai^bViZan ZmeZXiZY id WZ eV^Y, Ad1ZkZg* i]Z <dbeVcn bVn Z ; TBRCQIOSINM >IDEN ; EQUICER z M]Z <db eVcn-h Lj WhXg^ei^dc O^YZd LZgk^XZh hZ\ b Zci egdk^YZh hedgih* ZciZgiV^c b Zci VcY cZ 1 h hZgk^XZh id eVn+MO VcY higZV b^c\ hj WhXg^WZgh VcY di]Zg Xd b b ZgX^Va a^XZchZZh* eg^ b Vg^an k^V XVWaZ* hViZaa^iZ VcY ^ciZgcZi Y^hig^Wji^dc* VcY Xdch^hih d[&^' i]Z <db eVcn-h 43 # ^ciZgZhi ^c i]Z ?dmiZa @gdje & 1^i] i]Z gZb V^c^c\ 13 # ^ciZgZhi]ZaY Wn MZahigV* Vc : LQ+a^hiZY iZaZXd b b jc^XVi^dch Xd b eVcn' VcY &^' : jhigVa^Vc GZ 1 h <]VccZa &{ : G< |', M]Z ?dmiZa @gdje ^h i]Z aVg\Zhi : jhigVa^Vc+WVhZY hjWhXg^ei^dc iZaZk^h^dc egdk^YZg, Bih ?dmiZa eVn+MO hZgk^XZ egdk^YZh Veegdm^ b ViZan

		:`c eYV WZdTR] jVRcd V_UVU >f_V -*&				
		,*,,	,*,+	,* ,*		
			#Z_ ^ Z]]Z`_d\$			
<ve^iva td="" zmezcy^ijgzh8<=""><td></td><td></td><td></td><td></td></ve^iva>						
=^\^iVa KZVa >hiViZ LZgk^XZh	"	/.7	" 56	" 6.		
LjWhXg^ei^dc O^YZd LZgk^XZh		/71	/20	/77		
=d1 CdcZh		55	40	37		
; dd $IjWa^h]^c$		15	/4	/0		
GZ1h FZY ^N		6/	62	54		
Hi]Zg		0	6	/0		
MdiVa cY^ijgZh8						

OENGQAOHIC ; EGLEMSR

; TOOKE LEMSAK , ARH / KNV 2MFNQ LASINM

 $\label{eq:main_optimal_states} M]Z \ [daad 1^c \ iVWaZ \ hZih \ [dgi] \ i]Z < db \ eVcn~h \ bVh] \ eV^Y \ [dg \ iVmZh \ VcY \ ciZgZhi8$

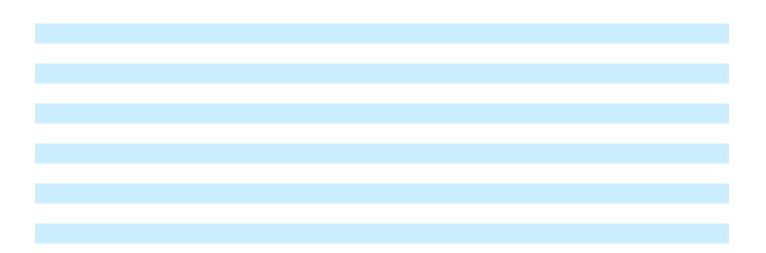
	:`c eYV WZdTR] jVRcd V_UVU >f_V -*&					
	,*,,	,*,+		,*,*		
		#Z_ ^ Z]]Z`_d\$				
<vh] [dg="" ^cizgzhi<="" ev^y="" td=""><td>" 74</td><td>. " 33</td><td>"</td><td>4/</td></vh]>	" 74	. " 33	"	4/		
$<$ Vh] eV^Y [dg iVmZh	/6.	/54		77		

*CCTLTKASED 8SHEQ , NLOQEHEMRIUE 5NRR

 $\label{eq:main_state} M]Z \ Xd \ b \ edc Z cih \ d[\ : XXj \ b \ j \ aViZY \ di]Zg \ Xd \ b \ egZ]Zch^kZ \ adhh \ 1 \ ZgZ \ Vh \ [daad \ 1 \ h8]$

	:`c eYV WZdTR] jVRcd V_UVU >f_V -*&				
	,*,,	,*,+ #Z_ ^Z]]Z`_d\$,* ,*		
: XXj b jaViZY di]Zg Xd b egZ]Zch^kZ adhh* cZi d[iVm8					
$<$ Vh] [ad 1]ZY\Z VY_jhi b Zcih8					
; $VaVcXZ^*WZ^cc^c d[nZVg$	Z	0	4		
?^hXVa nZVg VXi^k^in ^{&V'}	0/	&O'	å2'		
; VaVcXZ* ZcY d[nZVg	0/	Z	0		

BCH9 ,,(J 5@I 5H=CB 5B8 EI 5@=:M=B; 577CIBHG



=H9A 3(7<5B; 9G =B 5B8 8=G5; F99A9BHG K=H< 577CIBH5BHG CB 577CIBH=B; 5B8 :=B5B7=5@ 8=G7@CGIF9

GdcZ

=H9A 35(7CBHFC@G 5B8 DFC798 I F9G

8^zdT]`dfcV 7`_ec`]d R_U Dc`TVUfcVd

 $M]Z < db eVcn^h b VcV Z b Zci* 1^i] i]Z eVgi^X^eVi^Ac d[i]Z < db eVcn^h <]^Z[>mZXji^kZ H[[^XZg VcY <]^Z[?^cVcX^Va H[[^XZg*] Vh ZkVaj ViZY i]Z Z[[ZXi^kZcZhh d[i]Z < db eVcn^h Y^hXadhjgZ Xdcigdah VcY egdXZYjgZh &Vh hjX] iZg b ^h YZ[^cZY ^c KjaZh / 1V+/3&Z' VcY / 3&Y'+/3&Z' jcYZg i]Z LZXjg^i^Zh >mX]VcZ : Xi d[/712* Vh V b ZcYZY &i]Z {>mX}VcZ : Xi |'' Vh d[i]Z ZcY d[i]Z eZg^dY XdkZgZY Wn i]^h : ccj Va KZedgi, ; VhZY dc hjX] ZkVaj Vi^dc* i]Z < db eVcn^h <]^Z[>mZXji^kZ H[[^XZg VcY <]^Z[?^cVcX^Va H[[^XZg] VkZ XdcXaj YZY i]Vi* Vh d[i]Z ZcY d[hjX] eZg^dY* i]Z < db eVcn^h <]^Z[>mZXji^kZ H[[^XZg VcY <]^Z[?^cVcX^Va H[[^XZg] VkZ XdcXaj YZY i]Vi* Vh d[i]Z ZcY d[hjX] eZg^dY* i]Z < db eVcn^h <]^Z[>mZXji^kZ H[[^XZg VcY <]^Z[?^cVcX^Va H[[^XZg] VkZ XdcXaj YZY i]Vi* Vh d[i]Z ZcY d[hjX] eZg^dY* i]Z < db eVcn^h + ?^hXadhjgZ Xdcigdah VcY egdXZYjgZh 1ZgZ Z[[ZXi^kZ ^c gZXdgY^c * egdXZh^c * i] Vi* Vh d[i]Z ZcY d[hjX] eZg^dY* i]Z < db eVcn^h + ?^hXadhjgZ Xdcigdah VcY egdXZY jgZh 1ZgZ Z[[ZXi^kZ ^c gZXdgY^c * egdXZh^c * i] Vi* Vh d[i]Z zcY d[hjX] eZg^dY* i]Z < db eVcn^h + ?^hXadhjgZ Xdcigdah VcY egdXZY jgZh 1ZgZ Z[[ZXi^kZ ^c gZXdgY^c * egdXZh^c * egdXZh^c * i] b b Vg^o^c VcY gZedgi^c & v i^b Zan WVh^* ^c[dg b Vi^dc gZfj^gZY id WZ Y^hXadhZY Wn i]Z < db eVcn ^c i]Z gZedgih i] Vi ^i [^aZh dg hj W b^ih j cYZg i]Z >mX]Vc Z : Xi VcY 1ZgZ Z[[ZXi^kZ ^c Zchjg^c ` i] Vi ^c[dg b Vi^dc gZfj^gZY id WZ Y^hXadhZY Wn i]Z < db eVcn^h b VcV Zb Zci* ^cXaj Y^c ` i]Z < db eVcn^h <]^Z[>mZXji^kZ H[[^XZg VcY <]^Z[?^cVcX^Va H[[^XZg* Vh Veegdeg^ViZ id Vaad 1 i^b Zan YZX^h^dch gZ VgY^c gZfj^gZY YhXadhjgZ,$

A R_RXV ^ V_erd FVa`ce`_ =_eVc_R] 7`_ec`] CgVc : l_R_TZR] FVa`ce l_X

 $\label{eq:stars} F \ VcV \ Z \ b \ Z \ c'h \ g \ Z \ dgi \ d[i] Z \ c'Y \ Z \ c'Y \ c'Z \ c' \ g \ dg' \ d$

7 YR_XVd 1_ =_eVc_R] 7 `_ec`] `gVc :1_R_T1R] FVa`ce1_X

=H9A 36(CH<9F =B:CFA5H=CB

GdcZ

=H9A 37(8=G7@CGIF9F9;5F8=B; :CF9=;B>IF=G8=7H=CBGH<5HDF9J9BH=BGD97H=CBG

Gdi Veea^XVWaZ,

D5FH ===

=H9A +*(8=F97HCFG& 9L97IH=J9C::=79FG 5B8 7CFDCF5H9 ; CJ9FB5B79

 $M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZb 1^i] gZheZXi id i]Z < d b eVcn-h = ^gZXidgh ^h XdciV^cZY ^c i]Z Igdmn LiViZbZci [dg i]Z < d b eVcn-h 0.00 : ccjVa FZZi^c d[LidX^]daYZgh &i]Z {Igdmn LiViZbZci| 'id WZ [^aZY 1^i] i]Z L>< jcYZg i]Z]ZVY^c {IgdedhVa Gd, /8 > aZXi^dc d[= ^gZXidgh | VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,$

 $M]Z \wedge c[dg b Vi^{dc} gZf j^{g}ZY Wn i]^{h} iZb 1^{i} gZheZXi id i]Z < db eVcn^{h} ZmZX ji^{k}Z d[[^{X}Zgh ^{h} XdciV^{c}ZY ^{c} i]Z Igdmn LiViZ b Zci j cYZg i]Z JZVY^{c}
 {>mZX ji^{k}Z H[[^{X}Zgh d[GZ1h < dgedgVi^{d}c| VcY ^{h} ^{c}XdgedgViZY Wn gZ[ZgZcXZ ^{c} i]^{h} : cc jVa KZedgi,$

Md i]Z ZmiZci Veea^AXVWaZ^{*} i]Z ^c[dg b Vi^Adc gZf j^gZY Wn i]^Ah ⁱZ b 1ⁱ] gZheZXi id Xd b ea^AVcXZ 1ⁱ] LZXi^Adc /4&V' d[i]Z >mX]Vc\Z : Xi ^Ah XdciV^AcZY ^c i]Z Igdmn LiViZ bZci jcYZg i]Z]ZVY^Ac\ !=Za^Acf jZci LZXi^Adc /4&V' KZedgih! VcY ^Ah ^cXdgedgViZY Wn gZ[ZgZcXZ ^c c i]^Ah : cc jVa KZedgi,

M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZ b 1^i] gZheZXi id i]Z <d b eVcn~h LiVcYVgYh d[; jh^cZhh <dcY jXi ^h XdciV^cZY ^c i]Z Igdmn LiViZb Zci j cYZg i]Z]ZVY^c\ {<dgedgViZ @dkZgcVcXZ F ViiZgh z <dgedgViZ @dkZgcVcXZ Ida^X^Zh| VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,

M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZ b 1^i] gZheZXi id i]Z egdXZY jgZh Wn 1]^X] hZX jg^in]daYZgh b Vn gZXd b b ZcY cd b ^cZZh id i]Z ; dVgY d[=^gZXidgh ^h XdciV^cZY ^c i]Z Igdmn LiViZ b Zci j cYZg i]Z]ZVY^c \ {<dgedgViZ @dkZgcVcXZ F ViiZgh z LidX`]daYZg KZXd b b ZcYVi^dc d[=^gZXidg <VcY^YViZh| VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,

M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZ b 1^i] gZheZXi id i]Z <d b eVcn~h : jY^i <d b b^iiZZ* ^cXa jY^c \ i]Z : jY^i <d b b^iiZZ~h bZbWZgh VcY ^ih [^cVcX^Va ZmeZgi* ^h XdciV^cZY ^c i]Z Igdmn LiViZbZci jcYZg i]Z]ZVY^c \ {<dgedgViZ @dkZgcVcXZ F ViiZgh z ; dVgY <d b b^iiZZh | VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,

=H9A ++(9L97IH=J97CAD9BG5H=CB

M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZb 1^i] gZheZXi id ZmZX ji^kZ Xd b eZchVi^dc VcY Y^gZXidg Xd b eZchVi^dc ^h XdciV^cZY ^c i]Z Igdmn LiViZb Zci j cYZg i]Z]ZVY^c \h {<d b eZchVi^dc =^hXjhh^dc VcY : cVanh^*| {>mZXji^kZ <d b eZchVi^dc*| {IVn KVi^d| VcY {=^gZXidg <d b eZchVi^dc*| gZheZXi^kZan* VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,

Md i]Z ZmiZci Veea^AXVWaZ^{*} i]Z ^c[dg b Vi^Adc gZf j^AgZY Wn i]^A ⁱZb 1ⁱ] gZheZXi id Xd b eZchVi^Adc Xd b bⁱiZZ ^ciZgadX^h VcY ^cch^AYZg eVgi^AX^aeVi^Adc ^h XdciV^cCY ^cc i]Z Igdmn LiViZ bZci j cYZg i]Z]ZVY^c\ {<d b eZchVi^Adc <d b bⁱiZZ BciZgadX^h VcY Bch^AYZg IVgi^AX^aeVi^Adc | VcY ^h cXdgedgViZY Wn gZ[ZgZcXZ ^cc i]^A : ccjVa KZedgi,

 $M]Z Xd b eZchVi^dc Xd b b^{iiZZ} gZedgi gZf j^gZY Wn i]^h ^iZb ^h XdciV^cZY ^c i]Z Igdmn LiViZ bZci j cYZg i]Z]ZVY^c { KZedgi d[i]Z <d b eZchVi^dc <d b b^{iiZZ} VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,$

M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZ b 1^i] gZheZXi id Xd b eZchVi^dc eda^X^Zh VcY egVXi^XZh Vh i]Zn gZaViZ id i]Z <d b eVcn~h g^h` b VcV\Zb Zci ^h XdciV^cZY ^c i]Z Igdmn LiViZb Zci j cYZg i]Z]ZVY^c\ {K^h`h KZaViZY id <d b eZchVi^dc Ida^X^Zh VcY IgVXi^XZh | VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,

=H9A +,(G97 I F=HM CKB9FG<=D C: 79FH5=B 69B9:=7=5@ CKB9FG 5B8 A 5B5 ; 9A9BH 5B8 F9@5H98 GHC7?<C@89F A 5HH9FG

 $M]Z \wedge c[dg b Vi^{dc} gZfj^{g}ZY Wn i]^{h} iZb 1^{i} gZheZXi id hZXjg^{i^{T}}D Vji]dg^{O}ZY [dg^{hhj}VcXZ jcYZg i]Z < db eVcn^{h} Zfj^{in} Xd b eZchVi^{dc} eaVch^{h} XdciV^{c}ZY ^{c} i]Z Igdmn LiViZbZci jcYZg i]Z]ZVY^{c} { >fj^{in} < db eZchVi^{dc} IaVc Bc[dg b Vi^{dc} VcY^{h}^{c}XdgedgViZY Wn gZ[ZgZcXZ ^{c} i]^{h} : ccjVa KZedgi,$

 $M]Z \wedge c[dg b Vi^dc gZf j^gZY Wn i]^h \wedge iZb 1^i] gZheZXi id i]Z hZX jg^in d l cZgh]^e d[XZgiV^c WZcZ[^X^Va d l cZgh VcY b VcV \ Z b Zci ^h XdciV^cZY ^c i]Z Igdmn LiViZ b Zci j cYZg i]Z]ZVY^c \ {LZX jg^in H l cZgh]^e d[GZ l h < dgedgVi^dc | VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,$

=H9A +-(79FH5=B F9@5H=CBG<=DG 5B8 F9@5H98 HF5BG57H=CBG&5B8 8=F97HCF=B89D9B89B79

M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZ b 1^i] gZheZXi id igVchVXi^dch 1^i] gZaViZY eZghdch ^h XdciV^cZY ^c i]Z Igdmn LiViZ b Zci j cYZg i]Z]ZVY^c \ {<dgedgViZ @dkZgcVcXZ F ViiZgh z KZaViZY IZghdc MgVchVXi^dch Ida^Xn | VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : cc j Va KZedgi,

M]Z^c[dgbVi^dc gZfj^gZY Wn i]^h ^iZb 1^i] gZheZXi id Y^gZXidg ^cYZeZcYZcXZ ^h XdciV^cZY ^c i]Z Igdmn LiViZbZci jcYZg i]Z]ZVY^c\h {<dgedgViZ @dkZgcVcXZ FViiZgh z =^gZXidg BcYZeZcYZcXZ| VcY {<dgedgViZ @dkZgcVcXZ FViiZgh z ;dVgY <dbb^iiZZh| VcY ^h ^cXdgedgViZY Wn gZ[ZgZcXZ ^c i]^h : ccjVa KZedgi,

=H9A +.(DF=B7=D5@ 577CIBH5BH :99G 5B8 G9FJ=79G

 $M]Z ^c[dg b Vi^dc gZf j^gZY Wn i]^h ^iZb ^h XdciV^cZY ^c i]Z Igdmn LiViZ b Zci j c YZg i]Z]ZVY^c h { ?Zzh IV^Y id Bc YZeZc YZci KZ ^hiZgZY I j Wa^X : XXd j ci^c ^ ?^g b | VcY { : j Y^i < d b b^iiZZ I gZ+ : eegdkVa I da^X^Zh VcY I gdXZY j gZh | VcY ^h ^cXd gedgViZY Wn gZ[ZgZc XZ ^c i]^h : cc j Va KZedgi,$

=H9A +/(9L<=6=HG 5B8 :=B5B7=5@GH5H9A9BHG7<98I@9G

- V' M]Z [daad 1 ^c YdXj bZcih VgZ [^aZY Vh eVgi d[i]^h gZedgi8
 - /, M]Z <dbeVcn~h <dchda^YViZY ?^cVcX^Va LiViZbZcih gZfj^gZY id WZ [^aZY Vh eVgi d[i]^h : ccjVa KZedgi VcY i]Z KZedgih d[BcYZeZcYZci KZ\^hiZgZY IjWa^X : XXdjci^c\ ?^gb VgZ ^cXajYZY ^c IVgi BB* BiZb 6, ?^cVcX^Va LiViZbZcih VcY LjeeaZbZciVgn =ViV,

D5FH = J

- 0, : aa di]Zg [^cVcX^Va hiViZ bZci hX]ZY jaZh VgZ d b^iiZY WZXV jhZ i]Z gZf j^gZY ^c[dg b Vi^dc ^h cdi Veea^XVWaZ* dg WZXV jhZ i]Z ^c[dg b Vi^dc XVaaZY [dg ^h ^cXaj YZY ^c i]Z <d b eVcn~h <dchda^YViZY ?^cVcX^Va LiViZ b Zcih dg i]Z GdiZh id i]Z <dchda^YViZY ?^cVcX^Va LiViZ b Zcih,
- 1, >m]^W^ih z M]Z Zm]^W^ih a^hiZY j cYZg IVgi &W' WZad l VgZ [^aZY dg ^cXdgedgViZY Wn gZ[ZgZcXZ Vh eVgi d[i]^h : ccjVa KZedgi, : {x | ^YZci^[^Zh ZVX] b VcV\Zb Zci XdcigVXi dg Xd b eZchVidgn eaVc dg VggVc\Zb Zci gZfj^gZY id WZ [^aZY Vh Vc Zm]^W^i id i]^h : ccjVa KZedgi* VcY hjX] a^hi^c\ ^h ^cXdgedgViZY]ZgZ^c Wn gZ[ZgZcXZ,
- &W' >m]^W^ih

0,0

- 2,0 <u>BcYZcijgZ* YViZY : eg^a / 3* 0.0/* WZi 1 ZZci]Z <db eVcn VcY N,L, ; Vc` GVi^dcVa : hhdX^Vi^dc* Vh igj hiZZ,</u> <u>&BcXdgedgViZY Vn gZ[ZgZcXZ id >m]^W^i 2,/ id i]Z <jggZci KZedgi d[GZ 1 h <dgedgVi^dc dc ?dg b 6+D &?^aZ Gd,</u> .../+13547' [^aZY 1^i] i]Z LZXjg^i^Zh VcY >mX]Vc\Z <db b^hh^dc dc : eg^a / 3* 0.0/,'
- 2,1 $\frac{? \text{dg b } \text{d}[1,653 \# \text{LZc}^{d}\text{g} \text{GdiZh } \text{Y}\text{jZ} 0.07, \&BcXdgedgViZY Wn gZ[ZgZcXZ id >m]^{W^{i}} 2,0 id i]Z < jggZci KZedgi d[GZ1h]

$
- 2,2 <u>BcYZcijgZ* YViZY ?ZWgjVgn //* 0.00* WZi1ZZci]Z <dbeVcn VcY N,L, ;Vc` Mgjhi <dbeVcn* GVi^dcVa : hhdX^Vi^dc* VhigjhiZZ, &BcXdgedgViZY Wn gZ[ZgZcXZ id >m]^W^i 2,/ id i]Z <jggZci KZedgi d[GZ1h <dgedgVi^dc dc ?dg b 6+D &?^aZ Gd, .../+13547' [^aZY 1^i] i]Z LZXjg^i^Zh VcY >mX]Vc\Z <db b^hh^dc dc ?ZWgjVgn /2* 0.00,'</u>

- /.,0 : bZcYZY VcY KZhiViZY > b eadn bZci : $gZz bZci* YViZY CjcZ / 6* 0.0.* WZi 1 ZZc GZ 1 h < dgedgVi^dc VcY LjhVc$

- $\begin{array}{ll} \label{eq:linearconstruction} \end{tabular} \end{$
- /.,/3 LncY^XViZY ?VXa^in : \gZZbZci*YViZY Vh d[GdkZbWZg /3*0./7*Vbdc\ ?dmiZa FVcV\ZbZci Iin E^b^iZY*Vh ^c^i^Va Wdggd1Zg*i]Z^c^i^Va [^cVcX^Zgh cVbZYi]ZgZ^c*@daYbVcLVX]h : jhigVa^V Iin EiY*Vh FE : ;*VcY <dbbdc1ZVai] :Vc`d[: jhigVa^V*Vh [VX^a^in V\Zci, &BcXdgedgViZY Wn gZ[ZgZcXZ id >m]^W^i / .,2 id i]Z J jVgiZgan KZedgi d[GZ1h <dgedgVi^dc dc ?dg b / .+J &?^aZ Gd, .../+13547' [^aZY 1^i] i]Z LZXjg^i^Zh VcY >mX]Vc\Z <dbb^hh^dc dc ?ZWgjVgn 5* 0.0.,'
- $\begin{array}{r} \label{eq:linearconductive} \end{tabular} \end{tab$
- $\begin{array}{l} \label{eq:linearconduct} \label{eq:linearconduct} \end{tabular} \end{tabuar} \end{tabular} \end{tabular} \end{tabular} \end{tabular} \$
- $\begin{array}{l} \label{eq:linearconductive} \end{tabular} \end{tab$
- $\begin{array}{l} \label{eq:constraint} \label{eq:constraint} \end{tabular} \end{tabuar} \end{tabular} \end{tabular} \end{ta$
- $/.,0/ \underline{@jVgVcidg:hhjbei^{dc} = ZZY Idaa^{*} YViZY Vhd[GdkZbWZg/3^{*}0./7^{*}idi]Z < dbbdcMZgbh = ZZY Idaa^{*} YViZY Vhd[GdkZbWZg/3^{*}0./7^{*}idi]Z < dbbdcMZbWZg/3^{*} YViZY Vhd[GdkZbWZg/3^{*}0./$

9 i YZSZe

Bf^SVc 9iYZSZe 8VdTcZaeZ`_

- 0/,/ <u>E^hi d[LjWh^Y^Vg^Zh,(</u>
- 01,/ $\leq dchZci d[>gchi \ Rdjc \ EEI 1^i] gZheZXi id GZ1h < dgedgVi^dc,($
- $\frac{1}{0} \leq \frac{1}{2} \frac{2^{c} V c X^{A} V a H[[^{X}Zg < Zgi^{[^{X}Vi^{d}c} gZfj^{g}ZY Wn KjaZh / 1V+/2 VcY / 3Y+/2 jcYZgi]Z LZXjg^{i^{A}Zh} > mX]Vc X : Xi d[_{712* Vh V b ZcYZY,(}$
- $\frac{2 gi^{\Lambda XVi^{d}c d[<]^{Z}[>mZXji^{K}Z H[[^{X}Zg VcY <]^{Z}[?^{C}VcX^{Va} H[[^{X}Zg ejghjVci id /6 N,L,<, LZXi^{d}c /13.* Vh VYdeiZY]}{ejghjVci id LZXi^{d}c 7.4 d[LVgWVcZh HmaZn : Xi d[0..0,(())]}$
- /./ M]Z [daad l ^c \ [^cVcX^Va ^c[dg b Vi^dc [gd b i]Z KZ\^higVci~h : ccjVa KZedgi dc ?dg b /.+D [dg i]Z [^hXVa nZVg ZcYZY CjcZ 1.* 0.00 [dg b ViiZY ^c Bca^cZ Q ; KE8 &^' <dchda^YViZY LiViZ b Zcih d[HeZgVi^dch [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.9 &^' <dchda^YViZY LiViZ b Zcih d[<d b egZ]Zch^kZ BcXd b Z &Edhh' [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.9 &^' <dchda^YViZY LiViZ b Zcih d[<d b egZ]Zch^kZ BcXd b Z &Edhh' [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.9 &^' <dchda^YViZY ;VaVcXZ L]ZZih Vh d[CjcZ 1.* 0.00 VcY 0.0/9 &^k' <dchda^YViZY LiViZ b Zcih d[<Vh] ?ad 1 h [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.9 &k' <dchda^YViZY LiViZ b Zcih d[>f j^in [dg i]Z [^hXVa nZVgh ZcYZY CjcZ 1.* 0.00* 0.0/ VcY 0.0.9 VcY &k^' GdiZh id i]Z <dchda^YViZY ?^cVcX^Va LiViZ b Zcih, (</p>
- /.2 M]Z XdkZg eV\Z [gd b GZ1h <dgedgVi^dc\h : ccjVa KZedgi dc ?dg b / .+D [dg i]Z [^hXVa nZVg ZcYZY Cj cZ 1.* 0.00* [dg b ViiZY ^c Bca^cZ Q ; KE &^cXa j YZY Vh >m]^W^i / ./',(

(?^aZY]ZgZ1^i]

- $((?jgc^h]ZY]ZgZ1^i]$
- x F VcV\ZbZci XdcigVXi dg Xd b eZchVidgn eaVc dg VggVc\ZbZci
- r <ZgiV^Ac edgi^Adch d[i]^Ah Zm]^AW^Ai]VkZ WZZc db^AiiZY ejghjVci id BiZb 4. /&W'&/. 'd[KZ\jaVi^Adc L+D,

=H9A +0(:CFA +*'? GIAA5FM

GdcZ,

G=; B5HIF9G

I jghjVci id i]Z gZfj^gZbZcih d[LZXi^dc /1 dg /3&Y' d[i]Z LZXjg^i^Zh >mX]Vc\Z : Xi d[/712* i]Z gZ\^higVci]Vh Yjan XVjhZY i]^h gZedgi id WZ h^\cZY dc ^ih WZ]Va[Wn i]Z jcYZgh^\cZY* i]ZgZjcid Yjan Vji]dg^oZY,

; n8

-h-LjhVc IVcjXX^d

GfdR_DR_fTTZ` 7 YZVW:Z_R_TZR] CWWZTVc

=ViZ8 : $j \setminus jhi / 0^* 0.00$

I jghjVci id i]Z gZfj^gZbZcih d[i]Z LZXjg^i^Zh >mX]Vc \Z : Xi d[/712* i]^h gZedgi]Vh WZZc h^\cZY WZad 1 Wn i]Z [daad 1^c eZghdch dc WZ]Va[d[i]Z gZ higVci VcY c i]Z XVeVX^i^Zh VcY dc i]Z YViZh cY^XViZY8

GZX_RefcV	HZe]V	8 ReV
-h- KdWZgi C, M]dbhdc F`SVce >(HY`^d`_	<]^Z[>mZXji^kZ H[[^XZg VcY =^gZXidg &Ig^cX^eVa >mZXji^kZ H[[^XZg'	: j \ jhi /0* 0.00
-h-LjhVc IVcjXX^d GfdR_DR_fTTZ`	<]^Z[?^cVcX^Va H[[^XZg &Ig^cX^eVa ?^cVcX^Va H[[^XZg'	: j \ j hi /0* 0.00
-h- F Vgn\gVXZ =Z@gVo^d A RcjXcRTV 8V; cRkZ`	<]^Z[:XXdjci^c\ H[[^XZg &Ig^cX^eVa :XXdjci^c\ H[[^XZg'	: j \ jhi /0* 0.00
-h- D, KjeZgi FjgYdX] ?(FfaVce A fcU`TY	$>$ mZX j i^kZ <] V ^A g b V c	: j \ jhi /0* 0.00
-h- EVX]aVc D, F jgYdX] @RTY]R_ ?(A fcU`TY	$<$ d $+<$] V^g b V c	: j \ jhi /0* 0.00
-h- DZaan : ndiiZ ?V]] j 5 j`ee V	=^gZXidg	: j \ jhi /0* 0.00
-h- Cdhp F VgqV : ocVg >`dl ARcmR 5k_Rc	=^gZXidg	: j \ jhi /0* 0.00
-h- GViVa^Z ; VcXgd[i BReR]ZV 6R_Tc`We	=^gZXidg	: j \ j hi /0* 0.00
-h- IZiZg E, ; VgcZh DVeVc @(6Rc_Vd	=^gZXidg	: j \ jhi /0* 0.00
-h- : cV IVjaV IZhhdV 5_R DRf]R DVdd`R	=^gZXidg	: j \ jhi /0* 0.00
-h- F Vhgddg L^YY^f j^ A Rdc``c GZUUZb fZ	=^gZXidg	: j \ j hi /0* 0.00