JC>I:9 HI6I:H

H: 8JG>I>: H 6C9: M8=6C<: 8DBB>HH>DC

 $L \text{ OcXY}^{\text{Wd}} ^{9} = -0/4$

;DGB,+(F)

\$BQb[D^U%

FJ6GI:GANG:EDGIEJGHJ6CIIDH:81>DC, DG,08T%D; I=:H:8JG>I>:H:M8=6C<:68ID;,4./

;_b dXU aeQbdUb\i `UbY_T U^TUT 9USU] RUb .,' -+-,

IG6CH>I>DC G:EDGI EJGHJ6CI ID H: 8I>DC ,. DG ,08T% D; I=: H:8JG>I>: H:M8=6C<: 681 D; ,4./

; b dXU dbO^cYdY ^ `UbY T Vb] 8_]] \(\text{!cc}_^ ; \text{!\U Ce} \] \(\text{RUb} ++ , (.0214) \)

C: LH 8DGEDG6 I>DC

\$: hQSd ^Q] U _V bUWYcdbQ^d Qc c`USYYYUT Y^ Ydc SXQbdUb%

9U\0g0bU

/1(-40+42+

\$HdQdU_b_dXUbZebYcTYSdY_^_V Y^S_b`_bQdY_^_b_bWQ^YjQdY_^%

 $\$ $G)H) :] ` \ i Ub > TU^dYVYSQdY_^ C_)$

,-,, 6fU^eU_V dXU 6] UbYSQc' CUg N_b[' CUg N_b[

,++.1

\$6TTbUcc_V`bY^SY`Q\UhUSedYfU_VVYSUc%

\$OY` 8_TU%

\$-,-%/,1(./++

\$GUWYcdbQ^dlc dU\U`X_^U ^e] RUb' Y^S\eTY^W QbUQ S_TU%

HUSebYdYUc bUWYcdUbUT `ebceQ^d d_ HUSdY_^ ,-\$R%_V dXU 6Sd5

I Yd\U_V UQSX S\Qcc	Hi]R_\\$c\\	CQ J U _V UQSX UBSXQ^WU _^ gXYSX bUWYcdUbUT
9\Qcc 7 9_]]_^ Id_S['`Qb fQ\eU !+)+, `Ub cXQbU	DMI7	$JXU DQcTQa = \LRQ\LUUSd CQb[Ud]$
9\Qcc 8 9_]]_^ Id_S[' `Qb fQ\eU !+)+, `Ub cXQbU	DMI	$JXU DQcTQa = \LRQ\LUUSd CQb[Ud]$

?^TYSQdU Ri SXUS[]Qb[gXUdXUb dXU bUWYcdbQ^d5 \$, % XQc VY\UT Q\\ bU`_bdc bUaeYbUT d_RU VY\UT Ri IUSdY_^ ,._b ,0\$T%_V dXU IUSebYdYUc ;hSXQ^WU 7Sd_V ,4./ Teby'^W dXU `bUSUTY'^W ,-] _^dXc \$_b V_b ceSX cX_bdUb `UbY_T dXQd dXU bUWYcdbQ^d g Qc bUaeIbUT d_ VY\U ceSX bU`_bdc* Q^T \$-\% XQc RUU^ ceRZUSd d_ ceSX VY\Y^W bUaeYbU] U^dc V_b dXU `Qcd 4+ TQic) OUc

?^TYSQdU Ri SXUS[]Qb[gXUdXUb dXU bUWYcdbQ^d XQc ceR]YddUT \U\USdb_^YSQ\\i UfUbi ?^dUbQSdYfU : QdQ <\\U bUae\bUT d_RU ceR]YddUT \ebceQ^d d_He\U /+O_V HUWe\QdY_^ I(J \$1-.-)/+0_VdX'c \$XQ\dUb\ TebY^W dXU \bUSUTY^W ,-]_^dXc \$_b V_b ceSX cX_bdUb \bUSY_T dXQd dXU bUWYcdbQ^d g Qc bUaeYbUT d_ ceR] Yd ceSX VY\Uc\)

?^TYSQdU Ri SXUS[] Qb[gXUdXUb dXU bUWYcdbQ^d Yc Q \QbWU QSSU\UbQdUT VY\Ub' Q^ QSSU\UbQdUT VY\Ub' Q ^_^(QSSU\UbQdUT VY\Ub' Q c] Q\\Ub bU`_bdY^W S_] `Q^i'_b Q^ U] UbWY^W Wb_gdX S_] `Q^i) IUU dXU TUVY^YdY_^c_V pQbWU QSSU\UbQdUT VY\Ub'q pQSSU\UbQdUT VY\Ub'q pc] Q\\Ub bU`_bdY^W S_] `Q^i q Q^T pU] UbWY^W Wb_gdX S_] `Q^i q Y^ He\U , -R(- _V dXU ; hSXQ^WU 7 Sd)

BQbWU QSSU\UbQdUT VY\Ub D_^(QSSU\UbQdUT VY\Ub

7 SSU\UbQdUT VY\Ub

I] Q\\Ub bU`_bdY^W S_] `Q^i ;] UbWY^W Wb $_g$ dX S $_$] `Q^i

?V O^U | UbWY^W Wb gdX S | `O^i 'Y^TYSOdU Ri SXUS[| Ob[\footnote{V} dXU bUW\cdbO^d XQc U\USdUT ^ dd ecU dXU UbdU^TUT dbQ^c\footnote{V} ^ `Ub\ T V b S | `\iY^W g\fdX Q^i ^Ug _b bUfYcUT VY^Q^SYQ\ QSS_e^dY^W cdQ^TQbTc `b_fYTUT `ebceQ^d d_ IUSdY_^ , .\$Q% _V dXU ; hSXQ^WU 7 Sd)

; DGB ,+(F I67A: D; 8DCI:CIH

	FQWU
FQbd ?) <\^Q^S\'Q\ ?^V_b] Qd\'_^	
?dU] ,)<\^Q^S\Q\ IdQdU] U^dc	
9_^c_\YTQdUT	_
9_^c_\YTQdUT IdQdU]U^dc_V 9_]`bUXU^cYfU?^S_]UV_b dXU dXbUUQ^T cYh]_^dXcU^TUT:USU]RUb.,'-+-, Q^T-+-+ \$e^QeTYdUT%	
9_^c_\TQdUT 8Q\Q^SU IXUUdc Qc_V : USU] RUb .,' -+-, \$e^QeTYdUT% Q^T @e^U .+' -+-, \$QeTYdUT%	/
$9_^c_^{TQdUT} \ \ IdQdU\]\ U^dc_^V\ 9QcX<\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	0
D_dUc d_ dXU K^QeTYdUT 9_^c_\ITQdUT <\f^Q^S\fQ\ I dQdU] U^dc	1
$\label{eq:conditional} \begin{tabular}{ll} \$	-2
?dU] .) GeQ^dYdQdYfU Q^T GeQ\YdQdYfU : YcS_cebUc 7R_ed CQb[Ud HYc[/0
?dU] /) 9_^db_\c Q^T Fb_SUTebUc	/0
FQbd ??) EdXUb ?^V_b] QdY_^	
%dU],)BUWQ\Fb_SUUTY^Wc	/1
$?dU] ,7) HYc[< QSd_bc$	/1
?dU] -) K^bUWYcdUbUT IQ\Uc _V ;aeYdi IUSebYdYUc Q^T KcU _V Fb_SUUTc	/2
?dU] .) : UVQe\dc K`_^ IU^Y_b IUSebYdYUc	/2
?dU] /) CY^U IQVUdi : YcS_cebUc	/2
?dU] O) EdXUb ?^V_b] QdY_^	/2
?dU] 1); hXYRYdc	/3
IYW^QdebU	/4

8DCHDA>96I:9HI6I:B:CIHD;8DBEG:=:CH>K:>C8DB:

 $K^QeTYdUT6]YV_^c$

	;_b d	XU dXbUU] 9USU] F] _^dXc U^TUT RUb . ,'	;_b dXU cYh]_^dXc U^TUT 9 USU] RUb . ,'			
	-+-, -+-+			-+-,	-+-+		
DUd Y^S_] U	!	-1-	! -1,	! 0-4	! .+3		
EdXUb S_] `bUXU^c\fU _cc\ \\^S_] U5							
<_bUYW^ SebbU^Si dbQ^c\QdY_^ QTZecd] U^dc		\$.1%	.,0	\$-++%	/		
DUd SXQ^WU Y^ dXU VQYb fQ\eU _V SQcX V_g XUTWUc $^{\mathrm{SQV}}$,	0	-	\$ - %		
8U^UVId`\Q^ QTZecd] U^dc' ^Ud ^{\$R\\}		2	\$2%	,-	,		
EdXUb S_] `bUXU^c\fU _cc\ \\^S_] U		\$-3%	.+3	\$,31%	/-,		
9_]`bUXU^cYfU Y^S_]U		/	014	./.	2-4		
BUcc5 DUd Y^S_] U QddbYRedQR\U d_ ^_^S_^db_\\Y^W Y^dUbUcdc		\$-2%	\$.+%	\$43%	\$/.%		
BUcc5 EdXUb S_]		0	\$1.%	.3	\$3+%		
9_]`bUXU^cYfU Y^S_]U QddbYRedQR\U d_ DUgc 9_b`_bQdY_^ cd_S[X_\TUbc	!	-+2	! /21	! -3.	! 1+1		

- \$R% DUd _V Y^S_] U dQh Uh`U^cU \$RU^UVYd% _V !-] Y\\Y_^ Q^T \$!.%] Y\\Y_^ V_b dXU dXbUU] _^dXc U^TUT : USU] RUb .,' -+-, Q^T -+-+' bUc`USdYfU\i' Q^T Y^S_] U dQh Uh`U^cU _V !/] Y\\Y_^ Q^T ^Y\ V_b dXU cYh] _^dXc U^TUT : USU] RUb .,' -+-, Q^T -+-+' bUc`USdYfU\i)
- $\$ FbY] QbY\i S_^cYcdc _V V_bUYW^ SebbU^Si dbQ^c\QdY_^ QTZecd] U^d)

 $JXUQSS_{]} `Q^iY^W ^_dUcQbUQ^Y^dUWbQ) `Qbd_V dXUcUe^QeTYdUTS_^c_{YTQdUT} VY^Q^SYQ (cdQdU]U^dc)$

		;_b dXU c\h] _^d 9 USU] RUb	Xc U^TUT
	D_dUc	-+-,	-+-+
D`UbQdY^W QSdYfYdYUc5			
DUd Y^S_] U	!	0-4 !	.+3
7 TZecd] U^dc d_ bUS_^SY\U ^Ud Y^S_] U d_ ^Ud SQcX `b_fYTUT Ri _`UbQdY^W QSdYfYdYUc5			
: U`bUSYQdY_^ Q^T Q] _bdYj QdY_^			,
E`UbQdY^W\UQcU Uh`U^cU		1/	1/
; aeYdi _ccUc _V QWY\YQdUc	0	1	/
9QcX TYcdbYRedY_^c bUSUYfUT Vb_] QVYY\YQdUc		2	2
EdXUb' ^Ud	, .	\$,.+%	\$2,%
: UVUbbUT Y^S_] U dQhUc Q^T dQhUc `QiQR\U	, ,	24	-,
9XQ^WU Y^_`UbQdY^W QccUdc Q^T \YQRY\YdYUc' ^Ud _V QSaeYcYdY \YUc			

CDI: ,) 9:H8G>EI>DCD; 7JH>C:HH 6C9 76H>HD; EG:H:CI6I>DC

 $DUgc 9_b`_bQdY_^\$d_WUdXUb gYdX Ydc ceRcYTYQbYUc' pDUgc 9_b`_bQdY_^'q pDUgc 9_b`'q dXU p9_] `Q^i'q pgUq_b pecq% Yc Q W_RQV TYfUbcYYYUT] UTYQ Q^T Y^V_b] QdY_^ cUbfYSUc S_] `Q^i S_] `bYcUT_V RecY^UccUc QSb_cc Q bQ^WU_V] UTYQ' Y^S\eTY^W5 TYWYdQ\ bUQ\ UcdQdU cUbfYSUc' ceRcSbY`dY_^ fYTU_ cUbfYSUc Y^ 7 ecdbQ\YQ' ^Ugc Q^T Y^V_b] QdY_^ cUbfYSUc Q^T R__[`eR\YcXY^W)$

*>0F0 KC 7NB0BJP>PFKJ

 $JXU\ QSS_\]\ `Q^i''W\ e^QeT'dUT\ S_^c_\ YTQdUT\ VY^Q^SYQ\ cdQdU\]\ U^dc_V\ dXU\ 9_\]\ `Q^i'\ gXYSX\ QbU\ bUVUbbUT\ d_XUbUY^Qc\ dXU \\ p9_^c_\ YTQdUT\ <Y^Q^SYQ\ IdQdU\]\ U^dc'q\ XQfU\ RUU^\ `bU'\ QbUT\ Y^QSS_bTQ^SU\ gYdX\ WU^UbQ\\i QSSU\ dUT\ QSS_e^dY^W\ `bY^SY`\ Uc\ Y^dXU$

C: LH 8DGEDG6I>DC CDI:HID I=: JC6J9>I:9 8DCHDA>96I:9 ;>C6C8>6A HI6I:B:CIH

CDI: -) **G:K:CJ:**H

, , , , , , , , , , , , , , , , , , , ,			;_b dXU dXbUU]	_^dXc U^TUT 9U	SU] RUb .,' -+-,		
	9 YWYdQ\ GUQ\ : cdQdU HUbfYSUc	HeRcSbY`dY_^ KYTU_ HUbfYSUc	9_g ?_^Uc	7_[EeR\\cX\\^\\ \$\\^\] _^c\\	CUge BUTYQ	DdXUb	I_dQ\ GUfU^eUc
HUfU^eUc5				\$1] 1//1c.			
9YbSe\QdY_^ Q^T ceRcSbY`dY_^	! .	! /	! .01	! o	! -3+	! o	! ,'+2-
7TfUbdYcY^W		00	,/,	0	-4+	0	0,4
9_^ce] Ub	0	0	0	04/	0	0	04/
HUQ\ UcdQdU	.0-	0	0	0	0	0	.0-
EdXUb	13	,+	,,		13	0	,3+
J_dQ\HUfU^eUc	! /01	! /43	! 0+3	! 1,2	! 1.3	! o	! -'2,2
			: b dXU dXbUU 1	^dXc U^TUT 9U	SU] RUb . ,' -+-+		
	9 YWYdQ\ GUQ\ : cdQdU HUbfYSUc	HeRcSbY`dY_^ KYTU_ HUbfYSUc	9_g ?_^Uc	7[EeR\\rcX\!^\	CUge BUTYQ	DdXUb	I_dQ\ GUfU^eUc
HUfU^eUc5				\$Y^] Y\\Y_^c%			
9 \(\text{bSe} \) \(\Q\d\frac{1}{2} \) \(\Q^T \) \(\text{ceRcSb} \(\frac{1}{2} \) \(\frac^	! 3	! //1	! .,4	! o	! -02	! o	! ,'+.+
7TfUbdYcY^W	+	. 771	,,0	. 0	-/3	. 0	//3
9_^ce] Ub	0	0	0	0	0	0	0
HUQ\ UcdQdU	-3,	0	0	0	0	0	-3,
EdXUb	-+	,+	,-	-,	13	,	,
J_dQ\HUfU^eUc	!4	! 0,,	! //1	! 0//	! 02.	! ,	! -'/,/
			: b dXU cYh 1	^dXc U^TUT 91	USU] RUb . ,' -+- ,		
	9 YWYdQ\ GUQ' : cdQdU HUbfYSUc	HeRcSbY`dY_ KYTU_ HUbfYSUc		7[EeR\\cX\^\	CUgc BUTYQ	DdXUb	I_dQ\ GUfU^eUc
THE CHAPTER AND A				\$Y^] Y\\Y_^c	X		
HUfU^eUc5			2.0		1 010		1 / 4
9 YbSe\QdY_^ Q^T ceRcSbY`dY_^	! 1						! -',/4
7TfUbdYcY^W	11				,	0	4-/
9_^ce] Ub HUQ\ UcdQdU	o 12-			,',,3		0	,',,3 12-
EdXUb	, .3		1	o . /(0	.01
J_dQ\ HUfU^eUc	! 33-			_		! 0	! 0'-,4
	. 33			. ,,1.	. , ,/	<u> </u>	

; _b dXU cYh] _^dXc U^TUT 9USU] RUb . , ' -+-+

	9 YWYdQ\ GUQ\ : cdQdU HUbfYSUc	HeRcSbY`dY_^ KYTU_ HUbfYSUc	9_g ?_^Uc	7[EeR\\\CX\\^\	CUgc BUTYQ	DdXUb	I_dQ\ GUfU^eUc
				\$Y^] Y\\Y_^ c %			
HUfU^eUc5							
9 YbSe\QdY_^ Q^T ceRcSbY`dY_^	! ,1	! 33.	! 1.+	! o	! 0+.	! o	! -'+
7TfUbdYcY^W	03	,+0	,30	0	/	0	23+
9_^ce] Ub	0	0	0	41/	0	0	41/
HUQ\ UcdQdU	0,1	0	0	0	0	0	0,1
EdXUb	.4	,4	,2	.3	, -0	,	4
J_dQ\ HUfU^eUc	! 1-4	! ,'++2	! 3	! ,'++-	! ,'+1+	! ,	! /'0.,

8_^dbQSd \YQRY\YdYUc Q^T QccUdc

	;_b dXU dXbUU]_^dXc U^TUT 9USU] RUb .,'					;_b dXU cYh] _^dXc U^TUT 9USU] RUb . ,'		
			-+-+	-+-,	-+-,			
				\$Y^]	Y\\Y_ ^	`c%		
8Q\Q^SU' RUWY^^Y^W _V `UbY_T	!	/12	!	/+4	!	/2.	!	.43
: UVUbbQ_V bUfU^eU		304		200		,'12/		,'/1-
HUS_W^YdY_^ _V TUVUbbUT bUfU^eU\$Q\\		\$31/%		\$224%		\$,'123%		\$,'/3+%
EdXUb	0			,0		\$2%		-+
8Q\Q^SU' U^T _V `UbY_T	! /1-			/++	!	/1-	!	/++

J^ .,' 9 T _ ^ '

CDI: .) 68FJ>H>I>DCH

8T\KYZUXbY 1[Y0TKYY 3GOR_

; _b dXU c\bar{\text{N}}h] _^dXc U^TUT 9 USU] RUb . , ' -+-, D^U dY] U U] `_iUU dUb] Y^QdY_^ D^U dY] U U] `_iUU dUb] Y^QdY_^ DdXUb S_cdc RU^UVIdc RU^UVIdc DdXUb S_cdc I_dQ \$Y^] Y\\Y_^c% 8Q\Q^SU' RUWY^^Y^W _V `UbY_T 0, .0 31 1/ 4 2. .0 $7 TTYdY_^c$.2 3 /0 -3 1. FQi] U^dc \$2% \$2-% \$2-% \$10% \$14% \$.% EdXUb o o o o 8 QQQ?15&UWU^T _dV `UbY_T 04 11 . 1

 $7c_V : USU] RUb_., '-+-, 'bUcdbeSdebY^W \YQRY\YdYUc_V Q^b_hY] QdU\i_!.,_] Y\\Y_^ g UbU Y^S\eTUT Y^ dXU_8Q\Q^SU_IXUUd Y^ EdXUb_SebbU^d_\YQRY\YdYUc_Q^T_!-3_] Y\\Y_^ g UbU Y^S\eTUT Y^ EdXUb_^_(SebbU^d_\YQRY\YdYUc)$

CDI: 0) > CK: HIB: CIH

JXU 9_] $\Q^irc \Y^fUcd \] \U^dc \g \UbU S_] \bYcUT _V \dXU \V__ g \Y^W5$

		Dg^UbcXY` EUbSU^dQWU Qc_V 9USU]RUb.,'-+-,	6 c _ 9 USU] RUb		6c_V ?e^U .+' -+-,	
				\$Y^] Y\\Y_	^c%	
;aeYdi]UdX_TY^fUcd]U^dc ^{\$Q%}		fQbY_ec	!	-,0!		2,
; aeYdi cUSebYdYUc ^{\$R%}		fQbY_ec		-4+		-3+
<u>J_dQQ\?\$^fUcd_]</u> U*Ndc_c	Y	V B	! _]	0+0 4	^ j	.0,`

CDI: 1) 7DGGDL>C<H

	>^dUbUcd bQdU Qd 9USU] RUb . ,' -+- ,	B QdebYdi Qd 9USU] RUb . ,' -+-,	6c_V 9USU]RUb.,'-+-,	6c_V ?e^U .+' -+-,
			\$Y^] Y\\Y	_^c%
CUgc 8 b` bQdV ^				
-+-, IU^Y_b ^_dUc	.)320 "	CQi ,0' -+-4	! 431	! 430
$\frac{1}{3} \frac{\text{hdU}}{\text{cb}} = \frac{90\%}{3}$				
$-+$,4 9bUTYd VQSY\Yd $i^{\$R\%}$	-).1 "	CQi .,' -+-/	-,2	
-+,4 JUb] _Q^ VQSY\Ydi	1)-0 "	D_f' -+-/	,3,	,4+
$-+$,2 $M_b[Y^W SQ^YdQV VQSYYdi^{SRS}]$	-).1 "	CQi .,' -+-/	О	0
$ exttt{JU\cdbQ} < exttt{QSY\Yd}i$	2)3. "	: US' -+-2	24	1+
-+,- $KI \ bY f QdU \ QSU \ U^d \ o \ KI : \ bdY_^ \ o \ dbQ^SXU - $$$	/)-2 "	@e\ -0' -+	-+.	-+-
-+,- $KI \ bY fQdU \ QSU \ U^d \ o \ KI : \ bdY_^ \ o \ dbQ^SXU .$	/)/- "	@e\ -0' -+-/	,0-	,0-
-+,- $KI \ bYfQdU \ QSU \ U^d \ o \ 7K: \ bdY_^$	2)+/ "	@e\ -0' -+	2.	23
$G: 6 < b e^{\frac{90}{4}}$				
-+-, 8bYTWU VQSY\Ydi	о "	@e\ .,' -+	0	.,/
-+ 9bUTYd VQSY\Ydi o dbQ^SXU ,\$T%	,),- "	IU`,1'-+-/	-34	0
-+ 9bUTYd VQSY\Ydi o dbQ^SXU -\$T%	,)-2 "	IU`,1'-+-0	3	0
; Y^Q^SU \UQcU Q^T dXUb \YQRY\YdYUc			3-	,++
$J_dQ\ R_bb_g\gamma^wc$			-'-2+	-'.,.
BUcc5 SebbU^d `_bdY^\$U%			\$.+-%	\$-3%
$B_\W(dUb] R_bb_gY^Wc$! ,'413	! -'-30

 $R\$ 7 c _V : USU] RUb . ,' -+- ,' dXU <_hdU\ : URd =b_e^ XQT e^TbQg^ S_]] Yd] U^dc _V 7 ! . /+] Y\\Y_^ QfQY\QR\U e^TUb dXUcU VQSY\YdYUc)

 $7 \; fUbQWU' \; bUc`USdYfU\ i' \; Q^T \; \$YY\% \; bU \;] \; _fU \; dXU \; dg \; _Q^T \; , \; -(\;] \; _^dX \; Y^dUbUcd \; `UbY_T \; _`dY_^c \; V_b \; dXU \; bU\ U fQ^d \; ; \; eb_T_\ Qb \; HQdU \; R_bb_g \; Y^Wc)$

8-) /NKQL 8BCFJ>J@FJD

 $: eb \text{ } dXU \text{ } cYh \text{ }] \text{ } dXC \text{ } U^TUT : USU \text{ } RUb \text{ } ., '-+-, 'H; 7 = b_e \text{ } S_] \text{ } UdUT \text{ } UTRd \text{ } bUVY^Q^SY^W \text{ } Y^gXYSX \text{ } db \text{ } U^YTQ\Q \text{ } Q \text{ }$

;_b dXU dXbUU]_^dXc U^TUT 9USU] RUb .,' -+-+

		,_b axb axbob j_ axc b 101 9050 j kbb ., -+-+								
		8_]]_^ LS[8\Qcc 7 8_]]_^ Hd_S[6SSe]e\OdUT	6SSe]e\QdUT DdXUb 8_]`bUXU^c\fU	I_dQ\ CUgc 8_b`	C_^(S_^db_\\Y^W	I _dQ\
	HXQbUc	6]_e^d	HXQbUc	6]_e^d	EQ\T(\'\^	9 UVYSYd	A_cc	: ae\di	>^dUbUcdc	: ae\di
						\$Y^] Y\\Y_^c%				
8Q\Q^SU' IU`dU]RUb.+'	.4,	! /	-++	! -	!,-'+20	! \$.'-+2%	! \$,'0%	! 2'1.4	! 3,0	! 3'/0/
DUd Y^S_] U	O	О	0	О	0	,	0	,	.+	-1,
EdXUb S_] `bUXU^cYfU Y^S_] U	O	0	0	0	0	0	-/0	-/0	1.	.+3
: YfYTU^Tc	o	О	o	0	0	О	O	O	\$,%	\$,%
EdXUb	0	0	0	0	,1	0	0	,1	.1	0-
8Q\Q^SU' : USU] RUb .,' -+-+	.4,	! /	-++	! -	!,-'+4,	! \$-'421%	! \$44+%	! 3',.,	! 4/.	! 4'+2/

 $\begin{array}{l} Id_S[\ bU^c ebSXQcUc\ S_]\]\ U^SUT_^\ D_fU\]\ RUb\ 4'\ -+-\ ,'\ Q^T\ TebY^W\ dXU\ dXbUU\ Q^T\ cYh\]\ _^dXc\ U^TUT\ :\ USU\]\ RUb\ .\ ,'\ -+-\ ,'\ dXU\ 9_]\ ^Q^i\ bU^c\ ebSXQcUT\ Q^T\ ceRcUaeU^d\ bUdYbUT\ ,)/\]\ Y\\Y_^\ cXQbUc\ _V\ 9\Qcc\ 7\ 9_]\]\ _^\ Id_S[\ V_b\ Q^\ b_hY\]\ QdU\ i\ !\ ,\]\ Y\\Y_^\ CXQbUc\ _V\ 9\Qcc\ 8\ 9_]\]\ _^\ Id_S[\ V_b\ Q^\ b_hY\]\ QdU\ i\ !\ ,\ 0\]\ Y\\Y_^\)\ JXU\ 9_]\ ^Q^i\ TYT\ _d\ ^ebSXQcU\ Q^i\ _V\ Ydc\ 9\Qcc\ 7\ 9_]\]\ _^\ Id_S[\ V_b\ Q^\ b_hY\]\ _^dXc\ U^TUT\ :\ USU\]\ RUb\ .\ ,'\ -+-+) \\ \end{array}$

Hd_S[X_\TUb GYWXdc 6WbUU] U^d

	6c_V 9USU] RUb.,'-+-,				6c_V?e^U.+'-+-,			
	AUfU	AUfU∖ -	AUfU\.	I_dQ\ \$Y^]Y		AUfU\ -	AUfU\.	I _dQ\
6 ccUdc5								

9UbYfQdYfU >^cdbe] U^dc

JXU 9_]`Q^i Yc TYbUSd\i Q^T Y^TYbUSd\i QVVUSdUT Ri bYc[c Qcc_SYQdUT g YdX SXQ^WUc Y^ SUbdQY^] Qb[Ud S_^TYdY_^c) MXU^ TUU] UT Q``b_`bYQdU' dXU 9_]`Q^i ecUc TUbYfQdYfU Y^cdbe] U^dc d_] YdYWQdU dXU `_dU^dYQ\Y]`QSd_V dXUcU] Qb[Ud bYc[c) JXU `bY] Qbi] Qb[Ud bYc[c] Q^QWUT Ri dXU 9_]`Q^i dXb_eWX dXU ecU_V TUbYfQdYfU Y^cdbe] U^dc Y^S\eTU5

- $\begin{tabular}{ll} $V_bUYW^SebbU^Si$ $UhSXQ^WU$ $bQdU$ $bYc[5 QbYcY^W `bY] QbY\iddXb_eWX < hdU\ : URd = b_e` R_bb_gY^Wc TU^_] Y^QdUT Y^ K^YdUT $IdQdUc $pK)I)q% $T_\Qbc'` Qi] $U^dc V_b Secd_] Ub `bU] YcU UaeY`] $U^d Q^T SUbdQY^ `b_WbQ]] Y^W $bYWXdc6 Q^T $U^d Q^T SUbdQY^ $U^d Q^T SUBQY^ $U^$
- $\label{eq:continuous_problem} $$ $ Y^dUbUcd\ bQdU\ bYc[5\ QbYcY^W\ Vb_]\ VYhUT\ Q^T\ V_QdY^W\ bQdU<_hdU\ :\ URd\ =b_e\ R_bb_g\ Y^Wc) $$$

 $JXU 9_] `Q^i V_b] Q\i TUcYW^QdUc aeQ\YViY^W TUbYfQdYfUc Qc XUTWU bU\QdY_^cXY`c $pXUTWUcq\Q^T Q``\YUc XUTWU QSS_e^dY^W g XU^S_^cYTUbUT Q``b_`bYQdU) JXU 9_] `Q^i T_Uc ^_d ecU TUbYfQdYfU YY^Q^SYQ\ Y^cdbe] U^dc V_b dbQTY^W _b c`USe\QdYfU `eb`_cUc)$

: UbY $fQdY fUc QbU S QccYYYUT Qc SebbU^d b ^_(SebbU^d Y^ dXU 8QQ^SU IXUUdc RQcUT _^ dXUYb] QdebYdi TQdUc) HUVUb d_ dXU dQR\U RU_g V_b VebdXUb TUdQY\c5$

	7Q\Q^SU HXUUd A_SQdY_^	6c_V 9USU]RUb.,'-+-,	6c_V ?e^U .+' -+-,
		\$Y^] Y\\	'_ \c \\
<_bUYW^ SebbU^Si TUbYfQdYfUc (SQcX V_g XUTWUc	EdXUb SebbU^d QccUdc	! ,	! o
9b_cc SebbU^Si Y^dUbUcd bQdU TUbYfQdYfUc (VQYb fQ\eU XUTWUc	EdXUb SebbU^d QccUdc	, ,	0
9b_cc SebbU^Si Y^dUbUcd bQdU TUbYfQdYfUc	EdXUb SebbU^d QccUdc	/0	0
?^dUbUcd bQdU TUbYfQdYfUc (SQcX V_g XUTWUc			

C: LH 8DGEDG6I>DC CDI:HIDI=: JC6J9>I:9 8DCHDA>96I:9;>C6C8>6A HI6I:B:CIH

 $bUS \setminus QccYYYUT _ed _V 7SSe] e \setminus QdUT _dXUb S_] \cdot bUXU^cYfU \setminus _cc _fUb dXU bU] QY^Y^W dUb] _V dXU TUbYfQdYfUc) 9XQ^WUc Y^ dXU VQYb fQ \setminus UCU TUbYfQdYfUc gY \ XU bUS_W^YJUT gYdXY^ EdXUb' ^Ud Y^ dXU IdQdU] U^dc _V E \cdot UbQdY_^c _^ Q \cdot b_c \cdot USdYfU RQcYc)$

 $JXU \ d_dQ\ ^dY_Q\ fQ\ eU \ VSb_cc(SebbU^Si Y^dUbUcd bQdU \ cgQ\ cV_b \ gXYSX \ dXU \ 9_] \ ^Q^i \ TYcS_^dY^eUT \ XUTWU \ QSS_e^dY^W \ gQc \ Q^b_hY] \ QUU^i \ !-3+ \]Y_Y^A \ Qc_V \ : USU] \ RUb .,'-+-,) \ JXU \]QhY] \ e] \ XUTWUT \ dUb] \ _fUb \ gXYSX \ dXU \ 9_] \ ^Q^i \ Yc \ XUTWY^W \ Uh^cebU \ d_fQbYQRYYVI Y^AUbUcd \ Q^T \ bY^SY^Q \ Qi] \ U^dc Yc \ d_@e^i -+-/) \ 7c_V \ : USU] \ RUb .,'-+-,' \ dXU \ 9_] \ ^Q^i \ UcdY] \ QdUc \ dXQd \ Q^b_hY] \ QdU^i \ !. \]Y_Y^A \ ^U \ ^Ud \ TUbYfQdYfU \ WQY^c \ bUQdUT \ d_Ydc \ Sb_cc(SebbU^Si Y^dUbUcd \ bQdU \ cgQ^T \ TUbYfQdYfU \ SQcX \ V_g \ XUTWUc \ Y^SYETUT Y^A \ 7SSe] \ e^QdUT \ _dXUb \ S_] \ ^bUXU^cYfU \ _cc \ gY_N \ RU \ bUS^QccYYYUT Y^d_ \ dXU \ IdQdU] \ U^dc_V \ E^UbQdY_^c \ gYdXY^A \ dXU \ ^Uhd \ ,-1 \ _-dXc)$

 $JXU\ V_\setminus gY^W\ dQR\setminus Uc\ `bUcU^d\ dXU\ Y\]\ `QSd\ dXQd\ SXQ^WUc\ Y^dXU\ VQYb\ fQ\setminus eUc\ XQT\ _^7SSe\]\ e\setminus QdUT\ _dXUb\ S_]\ `bUXU^cYfU\ \setminus _cc\ Q^T\ dXU\ IdQdU\]\ U^dc\ _V\ E\ `UbQdY_^c\ TebY^W\ dXU\ dXbUU\ Q^T\ cYh\]\ _^dXc\ U^TUT\ :\ USU\]\ RUb\ .\ ,'\ -+-\ ,\ Q^T\ -+-+\ V_b\ R_dX\ TUbYfQdYfUc\ TUcYW^QdUT\ Qc\ SQcX\ V_g\ XUTWUc\ dXQd\ S_^dY^eU\ d_RU\ XYWX\ i\ UVVUSdYfU\ Q^T\ TUbYfQdYfUc\ Y^YdYQ\setminus i\ TUcYW^QdUT\ Qc\ SQcX\ V_g\ XUTWUc\ Red\ V_b\ gXYSX\ XUTWU\ QSS_e^dY^W\ g\ Qc\ TYcS_^dY^eUT\ Qc\ _V\ :\ USU\]\ RUb\ .\ ,'\ -+-+5$

	8_]`	<qy^ \\cc=""]<="" bus\\qccyvyut="" td="" vb_=""> 6SSe] e\(\lambdaUT DAXUb _] `bUXU^cYfU A_cc V_b dXU dXbUU] _^dXc U^TUT 9USU] RUb .,' \$<qy^\\\cc]<="" bus\\qccyvyut="" td="" vb_=""> 6SSe] e\(\lambdaUT DAXUb 8_] `bUXU^cYfU A_cc V_b dXU dXbUU] _^dXc U^TUT 9USU] RUb .,'</qy^\\\cc></qy^>					>^S_] U cdQdU] U^d _SQdY_^		
		+-,		-+-+		-+-,		-+-+	
				\$Y^] Y	\\Y_^	`c%			
<_bUYW^ SebbU^Si TUbYfQdYfUc (SQcX V_g XUTWUc	!	o	!	0	!	O	!	\$,%	E`UbQdY^W Uh`U^cUc
9b_cc(SebbU^Si Y^dUbUcd bQdU TUbYfQdYfUc		О		0		\$,%		0	?^dUbUcd Uh`U^cU' ^Ud
?^dUbUcd bQdU TUbYfQdYfUc (SQcX V_g XUTWUc		/		\$,%		\$,%		-	?^dUbUcd Uh`U^cU' ^Ud
J_dQ	!	/	!	\$,%	!	\$-%	!	,	
	8_]	QY^ \$_cc% 6SSe] e\(`bUXU^c\ft `dXc U^TUT	QdUT D J A_cc	dXUb V_b dXU cYh		\$ <qy^%_cc bus<br="">6SSe]e\Q B_]`bUXU^cYfU]_^dXc U^TUT</qy^%_cc>	dUT 1 A_c	OdXUb c V_b dXU cYh	>^S_] U cdQdU] U^d _SQdY_^
	8 ₋]	6SSe]e\(\)bUXU^c\\fl	QdUT D J A_cc	dXUb V_b dXU cYh] RUb . ,'		6SSe]e\0 B_]`bUXU^c\fU]_^dXc U^TUT -+-,	dUT 1 A_c	OdXUb c V_b dXU cYh	
	8 ₋]	6SSe]e\(\)`bUXU^c\\f\ `dXc U^TU]	QdUT D J A_cc	odXUb V_b dXU cYh] RUb . ,'		6SSe]e\0 B_]`bUXU^c\fU]_^dXc U^TUT -+-,	dUT 1 A_c	OdXUb c V_b dXU cYh U] RUb . ,'	
<_bUYW^ SebbU^Si TUbYfQdYfUc (SQcX V_g XUTWUc	8 ₋]	6SSe]e\(\)`bUXU^c\\f\ `dXc U^TU]	QdUT D J A_cc	dXUb V_b dXU cYh] RUb . ,'		6SSe]e\0 B_]`bUXU^c\fU]_^dXc U^TUT -+-,	dUT 1 A_c	OdXUb c V_b dXU cYh U] RUb . ,'	
	8 ₋]	6SSe]e\\`bUXU^c\fU \dXc U^TUT +-,	QdUT D J A_cc	OdXUb V_b dXU cYh] RUb . ,' -+-+ \$Y^] Y		6SSe] e\Q 3_] `bUXU^c\fu 3^dXc U^TUT -+-,	dUT 1 A_c	DdXUb E V_b dXU cYh U] RUb . , '	
XUTWUc	8 ₋]	6SSe] e\(\) bUXU^c\ft \dXc U^TUI \dXc U^TUI +-,	QdUT D J A_cc	OXXUb V_b dXU cYh] RUb . ,' -+-+ \$Y^] Y		6SSe]e\0 8_]`bUXU^ctffU]_^dXcU^TUT -+-,	dUT 1 A_c	DdXUb	E`UbQdY^W Uh`U^cUc

JXU Q] _e^dc bUS_W^YjUT Y^ EdXUb' ^Ud Y^ dXU IdQdU] U^dc _V E`UbQdY_^c bUce\dY^W Vb_] dXU SXQ^WUC Y^ VQYb fQ\eU _V Sb_cc(SebbU^Si Y^dUbUcd bQdU TUbYfQdYfUc dXQd gUbU TYcS_^dY^eUT Qc SQcX V_ g XUTWUC TeU d_ XUTWU Y^UVVUSdYfU^Ucc Qc _V : USU] RUb . ,' -+-+ gQc Q WQY^ _V Q``b_hY] QdU\i !3] Y\\Y_^ Q^T ! ,2] Y\\Y_^ V_b dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb . ,' -+- ,' bUc`USdYfU\i' Q^T Q _cc _V Q``b_hY] QdU\i !-] Y\\Y_^ V_b dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb . ,' -+-+)

$5GOX \setminus GR[K NKJMKY]$

 $JXU d_dQ\ ^-dY_^Q\ fQ\ U \ VQYb \ fQ\ U \ XUTWUC \ g \ Qc \ Q^\ b_hY \] \ QdU\ i \ !2+ \] \ Y\ Y\ Qc \ V \ : USU \] \ RUb \ . \ ,' \ -+- \ ,) \ JXU \] \ QhY \] \ e \] \ XUTWUT \ dUb \] \ _fUb \ g \ XYSX \ dXU \ 9_ \] \ Q^i \ Yc \ XUTWY^W \ Uh \ _cebU \ d_ \ fQbYQRY\Ydi \ Y^ Y^dUbUcd \ Qi \] \ U^dc \ Yc \ d_ @e\ i \ -+-/)$

 $: eby^w dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb ., '-+-, Q^T -+-+' dXU Q] _e^d bUS_W^YjUT Y^ dXU IdQdU] U^dc _V E^UbQdY_^c _^TUbYfQdYfU Y^cdbe] U^dc TUcYW^QdUT Qc VQYb fQ\eU XUTWUc bU\QdUT d_ dXU Y^UVVUSdYfU `_bdY_^ gQc ^Y\ Q^T !,] Y\\Y_^' bUc`USdYfU\i' Q^T USdYfU\i' Q^T USDYfQdYfU Y^UVUSdYfU Y^UVUSdYfU Y^UYUSdYfU YYUYUSDYFU YYUYUSDYFU YYUYUSDYFU YYUYUSDYFU YYUYUSDYFU YYUUSDYFU YYUYUSDYYUU YYUUSDYFU YYUYUSDYFU YYYUUSDYFU YYUYUSDYFU YYUYUSDYYUYUSDYYUYUSDYYUYUSDYYYUYUSDYYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUYUSDYYUYUSDYYUYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSDYYUYUSD$

 $dXUcU \] \ QddUbc) < UUc' \ Uh` U^cUc' \ VY^Uc'` U^Q dYUc' \ ZeTW \] \ U^dc \ _b \ cUdd \ U \] \ U^d \ S_cdc \ g \ XYSX \] \ YWXd \ RU \ Y^SebbUT \ Ri \ dXU \ 9_] \ Q^i \ Y^S_^VUSdY_^ g \ YdX \ dXU \ fQbY_ec` b_SUUTY^Wc \ S_eYT \ QT fUbcU \ i \ QWUSd \ Ydc \ bUce \ dc \ _V \ _` UbQdY_^c \ Q^T \ VY^Q^SYQ \ S_^TYdY_^)$

< K] Y O S KX0IG ; GXQKZ0TM

 $\label{thm:color:condition} $$ 'Y = Q^SUc RUY^W $$ bUS_bTUT QWQY^cd dQh RU^UVYdc Y^SUbdQY^V_bUYW^ZebYcTYSdY_^c gYdX_`UbQdY^W \ccUc Q^T dXU Y] `QSd_V V_bUYW^_`UbQdY_^c gXYSX QbU ceRZUSd d_XYWXUb dQh bQdUc'_VVcUd Ri Q bU] UQcebU] U^d_V TUVUbbUT dQhUc Y^dXU K)A)$

 $<_b \ dXU \ cYh \] \ _^dXc \ U^TUT \ : USU \] \ RUb \ . , '-+-+' \ dXU \ 9 \] \ ^Q^i \ bUS_bTUT \ Y^S_] \ U \ dQh \ Uh \ U^cU_V \ ! \ , \ + \] \ Y_{\ ^-} \ bU(dQh \ Y^S_] \ U_V \ ! \ / \ 3 \] \ Y_{\ ^-} \ bUce \ dY^W \ Y^Q \ UVUUSdY \ FU \ dQh \ bQdU \ dXQd \ g \ Qc \ XYWXUb \ dXQ \ dXU \ K)I) \ cdQded_bi \ dQh \ bQdU) \ JXU \ XYWXUb \ dQh \ bQdU \ g \ Qc \ bY \] \ QbY_i \ TeU \ d_fQeQdY_Q_{\ ^-} \ Q^SUc \ RUY^W \ bUS_bTUT \ QWQY^cd \ dQh \ RU^UVYdc \ Y^SUbdQY^V \ _bUYW^ \ ZebYcTYSdY_^c \ g \ ydX \ _^UbQdY^W \ _ccUc \ Q^T \ dXU \ Y \] \ ^QSd_V \ V_bUYW^ \ _^UbQdY_C \ g \ XYSX \ QbU \ ceRZUSd \ d_XYWXUb \ dQh \ bQdUc' \ _VVCUd \ Ri \ Q \ bU \] \ U^cd_V \ TUVUbbUT \ dQhUc \ Y^ \ dXU \ K)A)$

 $CQ^QWU] U^d QccUccUc QfQYQRU UfYTU^SU d_TUdUb] Y^U gXUdXUb ceVYYSYU^d VedebU dQhQRU Y^S_] U gY\RU WU^UbQdUT d_`Ub] Y^d dXU ecU_V UhYcdY^W TUVUbbUT dQh QccUdc) 8QcUT_^] Q^QWU] U^drc QccUcc] U^d_V QfQY\QR\U UfYTU^SU' Yd XQc RUU^ TUdUb] Y^UT dXQd Yd Yc]_bU \Y[U\i dXQ^ ^_d dXQd TUVUbbUT dQh QccUdc Y^ SUbdQY^ V_bUYW^ ZebYcTYSdY_^c] Qi ^_d RU bUQ\YjUT Q^T dXUbUV_bU' Q fQ\eQdY_^ Q\L_g Q^SU XQc RUU^ UcdQR\YcXUT QWQY^cd dX_cU dQh QccUdc)$

 $JXU 9_] `Q^i `QYT Wb_cc Y^S_] U dQhUc_V !4-] Y\\Y_^ Q^T !43] Y\\Y_^ TebY^W dXU cYh]_^dXc U^TUT : USU] RUb.,'-+-, Q^T -+-+' bUc`USdYfU\i' Q^T bUSUYfUT dQh bUVe^Tc_V !,] Y\\Y_^ Q^T !4] Y\\Y_^' bUc`USdYfU\i)$

CDI: ,-)H: < B:CI>C;DGB6I>DC

JXU 9_] `Q^i] Q^QWUc Q^T bU`_bdc Ydc RecY^UccUc Y^ dXU V__g Y^W cYh cUW] U^dc5

- W , FDFP>H 8B>H OF>PB 9BNRF@BO o JXU : YWYdQ\ HUQ\ ; cdQdU IUbfYSUc cUW] U^d S_^cYcdc _V dXU 9_] `Q^irc 1,)/ " Y^dUbUcd
 Y^ H; 7 = b_e ` Q^T 3+ " Y^dUbUcd Y^ C_fU) JXU bU] QY^Y^W -+ " Y^dUbUcd Y^ C_fU Yc XU\T Ri H; 7 = b_e `) H; 7
 = b_e ` Yc Q] Qb[Ud(\UQTY^W TYWYdQ\] UTYQ RecY^Ucc c`USYQ\YjY^W Y^ `b_`Ubdi Q^T Yc \YcdUT _^ dXU 7 ecdbQ\YQ^ IUSebYdYUc
 ; hSXQ^WU \$p 7 INq% \$7 IN5 H; 7%) H; 7 = b_e ` QTfUbdYcUc `b_`Ubdi Q^T `b_`Ubdi (bU\QdUT cUbfYSUc _^ Ydc gURcYdUc
 Q^T]_RY\U Q``c' Y^S\eTY^W 7 ecdbQ\YQrc \UQTY^W bUcYTU^dYQ\'S_]] UbSYQ\ Q^T cXQbU `b_`Ubdi gURcYdUc'
 bUQ\UcdQdU)S_])Qe' bUQ\S_]]UbSYQ\)S_])Qe Q^T <\Qd] QdUc)S_])Qe' Q^T `b_`Ubdi `_bdQ\c Y^ ?^TYQ) ?^ QTTYdY_^' H; 7
 = b_e ` `b_fYTUc `b_`Ubdi (bU\QdUT TQdQ d_ dXU YY^Q^SYQ\ cUSd_b Q^T YY^Q^SYQ\ cUbfYSUc dXb_eWX Q^ U^T(d_(U^T TYWYdQ\
 `b_`Ubdi cUQbSX Q^T YY^Q^SY^W Uh`UbYU^SU Q^T Q] _bdWQWU Rb_[Y^W _VVUbY^W)</pre>

_ ___

- $7D9 _`UbQdUc\ dXU\ IAO\ D\ ;MI\ ^Udg_b['\ 7ecdbQ\YQrc\ -/(X_eb\]\ e\d''(SXQ^^U)'\]\ e\d''(`\QdV_b\]\ ^Ug\ c\ Ubf\YSU)\ 7D9 \\ SXQ^^U\c\ QbU\ TYcdbYRedUT\ dXb_eWX_ed\ 7\ ecdbQ\YQ\ Q^T\ DUg\ PUQ\Q^T\ Q^T\ QfQY\QR\U\ _^<_hdU\Q^T\ I\ [\ i\ DUdg_b\ [\ JU\Uf\YcY_DP)\ 7D9\ Q\c\ _g^c\ Q^T\ _`UbQdUc\ dXU\ Y^dUb^QdY_Q\ 7\ ecdbQ\YQ\ 9XQ^^U\ ?FJL\ cUbfYSU\ Q^T\ _VVUbc\ S_^dU^d\ QSb_cc\ Q\ fQbYUd\ i\ _V\ TYWYdQ\]\ UTYQ\ `QdV_b\]\ c'\ Y^S\eTY^W\ gUR'\]\ _RY\U\Q^T\ dXYbT(`Qbd\ i\ `b_fYTUbc)$
- W , KS 2KJB0 o JXU : _g @_^Uc cUW] U^d S_^cYcdc _V : _g @_^Uc' Q W_RQ\ `b_fYTUb _V ^Ugc Q^T RecY^Ucc Y^V_b] QdY_^'
 gXYSX TYcdbYRedUc Ydc S_^dU^d Q^T TQdQ dXb_eWX Q fQbYUdi _V] UTYQ SXQ^^U\c Y^S\eTY^W ^Ugc Q^T Ubc' ^Ugc gYbUc'
 gURcYdUc' Q` `\YSQdY_^c' _b Q` `c' V_b] _RY\U TUfYSUc' dQR\Udc Q^T U(R__[bUQTUbc' ^Ugc\UddUbc'] QWQjY^Uc' `b_` bYUdQbi
 TQdQRQcUc' \YfU Z_eb^Q\Yc] ' fYTU_ Q^T `_TSQcdc) JXU : _g @_^Uc cUW] U^drc `b_TeSdc' gXYSX dQbWUd Y^TYfYTEQ\
 S_^ce] Ubc Q^T U^dUb`bYcU Secd_] Ubc' Y^S\eTU BNK E GRR AZXKKZ 9U[XTGR' <QSdYfQ' : _g @_^Uc HYc[# 9_] `\YQ^SU'
 : _g @_^Uc DUgcgYbUc' 1GXXUTbY' CQb[UdMQdSX Q^T ?^fUcd_brc 8ecY^Ucc : QY\i)</pre>
- *KKG 7Q?#OEFJD o JXU 8__ [FeR\YcXY^W cUW] U^d S_^cYcdc _V >Qb`Ub9_\\Y^c' dXU cUS_^T \QbWUcd S_^ce] Ub R__ [
 `eR\YcXUb Y^ dXU g_b\T' gYdX _`UbQdY_^c Y^ , 2 S_e^dbYUc Q^T `QbdYSe\Qb cdbU^WdXc Y^ WU^UbQ\ YYSdY_^' ^_\YSdY_^'
 SXY\TbU^rc Q^T bU\YWY_ec `eR\YcXY^W) >Qb`Ub9_\\Y^c _g^c] _bU dXQ^ , -+ RbQ^TUT `eR\YcXY^W Y] `bY^dc' Y^S\eTY^W
 >Qb`Ub' MY\\YQ] C_bb_g' >Qb`Ub9_\\Y^c 9XY\TbU^rc 8__[c' 7 f_^' >Qb\UaeY^ Q^T 9XbYcdYQ^ `eR\YcXUbc P_^TUbfQ^
 Q^T JX_] Qc DU\c_^' Q^T `eR\YcXUc g_b[c Ri gU\\([^g^QedX_bc ceSX Qc >Qb`Ub BUU' =U_bWU EbgU\\' 7WQdXQ
 9XbYcdYU Q^T P_bQ DUQ\U >ebcd_^' Qc gU\\ Qc W_RQ\ QedX_b RbQ^Tc Y^S\eTY^W @)H)H) J_\[YU^' 9)I) BU gYc' : Q^YU\
 IY\fQ' AQbY^ I\QeWXdUb Q^T : b) CQbdY^ BedXUb AY^W' @b) ?d Yc Q\c_ X_] U d_] Q^i RU_fUT SXY\TbU^rc R__[c Q^T QedX_bc Q^T Q cYW^YYYSQ^d 9XbYcdYQ^ `eR\YcXY^W RecY^Ucc)
- *** **SBSO 4BAF> o JXU DUgc CUTYQ cUW] U^d S_^cYcdc `bY] QbY\i _V DUgc 9_b` 7 ecdbQ\YQ' DUgc KA Q^T dXU < K] FUXQ >UYZ Q^T Y^S\eTUc' Q] _^W _dXUb `eR\YSQdY_^c' BNK O[YZXGROGT\| BNK 3 GOR_ BKRKMXGVN\| 7 KXGRJ A[T\| BNK 2 U[XOKX ; GOR Q^T BNK OJ\KXZOYKX Y^ 7 ecdbQ\YQ Q^T BNK BOSKY\| BNK A[TJG_ BOSKY\| BNK A[T Q^T BNK A[T UT A[TJG_ Y^ dXU K)A)

			;_b dXU dXbUU]_^dXc U^TUT 9USU] RUb . ,'		; _b dXU c\h] 9 USU] RU			Kc U^TUT		
				-+-,		-+-+		-+-,		-+-+
						\$Y^] Y	\\Y_^e	c% ,		
HUfU^eUc5										
: YWYdQ\ HUQ\ ; cdQdU IUbfYSUc			!	/01	!	4	!	33-	!	1-4
I eRcSbY`dY_^ LYTU_ I UbfYSUc				/43		0,,		,'++3		,'++2
:_g @_^Uc				0+3		//1		40-		3
8[FeR\YcXY^W				1,2		0//		,',1.		,'++-
DUgc CUTYQ .4 .4	.4	.4		1.3		02.		,'-,/		,'+1+
E dXUb	‰ ‰			О		,		O		,
J_dQ\bUfU^eUc			!	-'2,2	!	-'/,/	!	0'-,4	!	/'0.,
IUW]U^d;8?J:75										
: YWYdQ\ HUQ\ ; cdQdU IUbfYSUc			!	,23	!	,/-	!	.,1	!	-1,
IeRcSby`dy_^ LYTU_ IUbfYSUc				31		, -/		-++		-+-
:_g @_^Uc				,//		,+4		4		,3,
8[FeR\YcXY^W				,+2	‰					9

C: LH 8DGEDG6I>DC CDI:HIDI=: JC6J9>I:9 8DCHDA>96I:9 ;>C6C8>6A HI6I:B:CIH

	9USU]	6 c _V RUb . ,' -+- ,	6c_V ?e^U .+' -+-,
		\$Y^] Y\	\Y_^c%
=Tg \\ Q^T \^dQ^WYR\U QccUdc' ^Ud5			
: YWYdQ\ HUQ\ ; cdQdU IUbfYSUc	!	, '3-2	! ,'32,
IeRcSby`dy_^ LyTU_ IUbfySUc		, '0+1	,'1,-
:_g @_^Uc		, '431	, '440
8_[FeR\\cXY^W		,'+,2	,'+/1
DUgc CUTYQ		.+.	.+3
$J_dQ = \underline{Tg} / Q^T '^dQ^WYR U QccUdc' ^Ud$!	1'1.4	! 1'3

CDI: ,.) 699>I>DC6A;>C6C8>6A>C;DGB6I>DC

8B@BFR>?HBO" **J**BP

 $HUSUYfQR\Uc\QbU`bUcU^dUT^Ud_VQ\QSUc'\ gXYSX\ bUV\USd\ dXU\ 9_]`Q^irc\ Uh`USdUT\ SbUTYd_ccUc\ RQcUT_^XYcd_bYSQ\ Uh`UbYU^SU\Qc\ gU\Qc\ SebbU^d\ Q^T\ Uh`USdUT\ US_^_]\ YS\ S_^TYdY_^c)$

HUSUYfQR\Uc' ^Ud S_^cYcd _V5

	9	6 c _V USU] RUb . ,' -+- ,	6c_V ?e^U.+'-+-,
		\$Y^] Y	\\Y_^c%
HUSUYfQR\Uc	!	,'2.3	! ,'014
BUcc5 Q_g Q^SUc		\$2.%	\$2,%
HUSUYfQR\Uc' ^Ud	<u>!</u>	,'110	! ,'/43

6PEBN 5KJ#+QNNBJP)00BP0

	6c_V 9USU]RUb.,'-+-,		6c_V ?e^U .+' -+-,
		\$Y^] Y\\Y	ĭ_^c%
H_iQ\di QTfQ^SUc d_ QedX_bc	!	.43	! /+1
HUdYbU] U^d RU^UVYd QccUdc		,./	,-+
?^fU^d_bi ^{\$Q\$}		-1-	-24
DUgc 7] UbYSQ CQb[UdY^W TUVUbbUT S_^cYTUbQdY_^		,.0	, -3
EdXUb		/01	0,/
J_dQ\ EdXUb ^_^(SebbU^d QccUdc	!	,'.30	! ,'//2

C: LH 8DGEDG6I>DC CDI:HIDI=: JC6J9>I:9 8DCHDA>96I:9;>C6C8>6A HI6I:B:CIH

6 PEBN +QNNBJP 3F>?FHFPFB0

	6 c _V 9 USU] RUb . ,' -+- ,		6c_V ?e^U .+' -+-,
		\$Y^] Y\\Y_	_^c%
H_iQ\dYUcQ^TS_]]YccY_^c`QiQR\U	!	/!	-+1
9 ebbU^d _`UbQdY^W \UQcU \YQRY\YdYUc		,/.	,/.
$7_gQ^SUV_bcQ\UcbUdeb^c$		-,+	,4+
9ebbU^d dQh `QiQR\U			.+
EdXUb		.3+	0+/
J_dQ\ EdXUb SebbU^d \\QR\\\Id\Uc	!	,'+++ !	,'+2.

6 PEBN" JBP

 $JXUV_{g}^VW dQRU cUdcV_bdX dXUS_]^_^U^dc_V EdXUb'^UdS$

	;_b dXU dXbUU]_^dXc U^TUT 9USU] RUb.,'			;_b	dXU c\h] 9USU]] _^dXc U^TUT RUb . ,'		
	-+	·- ,	-+-+			+-,		+-+
				\$1^]	\\Y_^c%			
HU] UQcebU] U^d_V UaeYdi cUSebYdYUc	!	\$4%	!	.2	!	,4	!	/1
: YfYTU^Tc bUSUYfUT Vb_] UaeYdi cUSebYdi Y^fUcd]U^dc		4		,		,+		
\$B_cc\\ \WQ\Y^ _^ cQ\\U _\V \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		\$4%		0		43		0
$= QY^{-} bU] UQcebU] U^{d} V bUfY_ec i (XUVT Y^{d}UbUcd^{SR})$				2				2
EdXUb		\$,%		4		О		,0
J_dQ\ EdXUb' ^Ud	!	\$2%	!	0/	!	,.+	!	2,

 $$Q\% : ebY^W dXU cYh]_^dXc U^TUT : USU] RUb .,'-+-,'H; 7 = b_e `QSaeYbUT Q^, 3 " Y^dUbUcd Y^ Fb_`Ubdi = ebe Y^ UhSXQ^WU V_b Q\\ cXQbUc _V H; 7 = b_e `rc U^dYdYUc Y^ C Q\QicYQ Q^T JXQY\Q^T) JXU 9_] `Q^i bUS_W^YjUT Q WQY^_V !,+2] Y\\Y_^ _^ dXU TYc `_cYdY_^ _V ceSX U^dYdYUc)$

9QLLHBIBJP>H+>0E.HKSIJCKNI>PFKJ

JXU V__gY^W dQR\U cUdc V_bdX dXU 9_] `Q^irc SQcX `QYT V_b dQhUc Q^T Y^dUbUcd5

_	;_b dXU c\h] 9USU]	_^dXc U' RUb .,'	TUT
	-+-,		+-+
	\$Y^]	Y\\Y_^ c %	
!	/4	!	-3
!	4-	!	43

CDI: ,/)HJ7H:FJ:CI:K:CIH

 $?^{\circ} < URbeQbi -+--' dXU 9_] ^{\circ} irc 8_{bT_V} : YbUSd_bc TUSQbUT Q cU] Y(Q^{\circ}QSQcX TYfYTU^T_V !+), + `Ub cXQbU V_b 9_{Qcc} 7 9_]]_^ Id_S[Q^T 9_{Qcc} 8 9_]]_^ Id_S[) JXU TYfYTU^T Yc ^QiQR_U_^ 7^bY_, .'-+-- d_cd_S[X_TUbc_V bUS_bT Qc_V CQbSX_, 1'-+--)$

>I:B-)B6C6<:B:CIIH9>H8JHH>DC6C96C6ANH>HD;;>C6C8>6A8DC9>I>DC6C9G:HJAIHD; DE:G6I>DCH

BNOY JUI[SKTZW OTIR[JOTM ZNK LURRU] OTM JOYI[YYOUT GTJ GTGR_YOYW IUTZGOTY YZGZK SKTZY ZNGZ IUTYZOZ[ZK `LUX] GXJ&RUUQOTM
YZGZK SKTZYA] OZNOT ZNK SKGTOTM UL AKIZOUT *) 4 UL ZNK AKI[XOZOKY 4^INGTMK OIZ UL) . +, % GY G SKTJKJ #ZNK `4^INGTMK OIZ &% GTJ
AKIZOUT *-O UL ZNK AKI[XOZOKY OIZ UL) . ++% GY G S KTJKJ' ORR YZGZK SKTZY ZNGZ GXK TUZ YZGZK SKTZY UL NOYZUXOIGR LGIZ GXK LUX] GXJ&
RUUQOTM YZGZK SKTZY' BNK] UXJY `K^VKIZWA `] ORR%A `KYZO S GZK%A `GTZOIOVGZK%A `VXKJOIZWA `HKROK\KA GTJ YO SORGX K^VXXYYOUTY GTJ
\GXOGZOUTY ZNKXKUL GXK OTZKTJKJ ZU OJKTZOL_LUX] GXJ&RUUQOTM YZGZK S KTZY BNKYK YZGZK S KTZY GVVKGX OT G T[SHKX UL VRGIKY OT ZNOY
JOYI[YYOUT GTJ GTGR_YOY GTJ OTIR[JK YZGZK S KTZY XKMGXJOTM ZNK OTZKTZW HKROKL UX I [XXKTZ K^VKIZGZOUTY UL ZNK 2 U S VGT_W OZY JOXKIZUXY
UX OZY ULLOIKXY] OZN XKYVKIZ ZUW G S UTM UZNKX ZNOTMYW ZXKTJY GLLKIZOTM ZNK 2 U S VGT_BY LOTGTIOGR IUTJOZOUT UX XKY[RZY UL UVKXGZOUTYW
ZNK 2 U S VGT_BY YZXGZKM_ GTJ YZXGZKMOI OTOZOGZO\KY GTJ ZNK U[ZIU S K UL IUTZOTMKTIOKY Y[IN GY ROZOMGZOUT GTJ OT\KYZOMGZOUTY' @KGJKXY
GXK IG[ZOUTKJ ZNGZ GT_LUX] GXJ&RUUQOTM YZGZK S KTZY GXK TUZ M[GXGTZKKY UL L[Z[XK VKXLUX S GTIK GTJ OT\UR\K XOYQY GTJ
[TIKXZGOTZOKY' ; UXK OTLUX S GZOUT XKMGXJOTM ZNKYK XOYQY GTJ [TIKXZGOTZOKY GTJ UZNKX O S VUXZGTZ LGIZUXY ZNGZ IU[RJ IG[YK GIZ[GR
XKY[RZY ZU JOLLKX S GZKXOGRR_LXU S ZNUYK OT ZNK LUX] GXJ&RUUQOTM YZGZK S KTZY OY YKZ LUXZN [TJKX ZNK NKGJOTM `@OYQ 5 GIZUXYA OT >GXZ 8W
8ZK S) O'OT < K] Y 2 UXVUXGZOUTBY OTT[GR @KVUXZ UT 5 UX S) (&: LUX ZNK LOYIGR _KGX KTJKJ 9 [TK + (**)*)

- ; hSXQ^WU $p7INq\% 7IN5H; 7\%)H; 7 = b_e^ QTfUbdYcUc^b_`Ubdi Q^T`b_`Ubdi (bU\QdUT cUb fYSUc_^ Ydc gURcYdUc Q^T]_RY\U Q^`c' Y^S\eTY^W 7 ecdbQ\YQrc \UQTY^W bUcYTU^dYQ\'S_]]UbSYQ\ Q^T cXQbU`b_`Ubdi gURcYdUc' bUQ\UcdQdU)S_])Qe' bUQ\S_]]UbSYQ\S_]Qe Q^T <\Qd]QdUc)S_])Qe' Q^T `b_`Ubdi `_bdQ\c Y^ ?^TYQ) ?^ QTTYdY_^' H; 7 = b_e^ `b_fYTUc^b_`Ubdi (bU\QdUT TQdQ d_ dXU YY^Q^SYQ\ cUSd_b Q^T YY^Q^SYQ\ cUbfYSUc dXb_eWX Q^ U^T(d_(U^T TYWYdQ\ b `Ubdi cUQbSX Q^T YY^Q^SY^W Uh`UbYU^SU Q^T Q] bdWQWU Rb [Y^W VVUbY^W)$
- W 9Q?0@NFLPFKJ <FABK 9BNF@B0 o JXU 9_] `Q^irc IeRcSbY`dY_^ LYTU_ IUbfYSUc cUW] U^d `b_fYTUc c`_bdc'
 U^dUbdQY^] U^d Q^T ^Ugc cUbfYSUc d_ `Qi(JL Q^T cdbUQ] Y^W ceRcSbYRUbc Q^T_dXUb S_]] UbSYQ\\YSU^cUUc' `bY] QbY\i
 fYQ SQR\U' cQdU\\YdU Q^T Y^dUb^Ud TYcdbYRedY_^' Q^T S_^cYcdc _V \$Y% dXU 9_] `Q^irc 10 " Y^dUbUcd Y^ dXU <_hdU\ =b_e`
 \$g YdX dXU bU] QY^Y^W .O " Y^dUbUcd XU\T Ri JU\cdbQ' Q^ 7 IN(\YcdUT dU\US_]] e^YSQdY_^c S_] `Q^i% Q^T \$YY% 7 ecdbQ\YQ^
 DU gc 9XQ^^U\ \$p7D9q%) JXU <_hdU\ =b_e` Yc dXU \QbWUcd 7 ecdbQ\YQ^(RQcUT ceRcSbY`dY_^ dU\UfYcY_^ `b_fYTUb' g YdX
 ^UQb\i -++ SXQ^^U\c S_fUbY^W c`_bdc' WU^UbQ\ U^dUbdQY^] U^d'] _fYUc' T_Se] U^dQbYUc'] ecYS' SXY\TbU^rc
 `b_WbQ]] Y^W Q^T ^Ugc) <_hdU\ Q^T dXU AQi_ I`_bdc cdbUQ] Y^W cUbfYSU__VUUb dXU \UQTY^W c`_bdc `b_WbQ]] Y^W</pre>

) @MQFOFPFKJ KC 1JRBOPKNYO *QOFJBOO , >FHU

G:HJAIHD; DE:G6I>DCH

8 BOQHPO KC 6 LBN>PFKJO X . KN PEB PENBB > JA OFT I KJPEO BJABA , B@B I ?BN (&" '%' & RBNOQO PEB PENBB > JA OFT I KJPEO BJABA , BW (&" '%' & RBNOQO PEB PENBB > JA OFT I KJPEO BJABA ,

 $JXU V_{\g}^W dQRU cUdc V_bdX dXU 9_] ^Q^irc _ UbQdY^W bUce^dc V_b dXU dXbUU Q^T cYh]_^dXc U^TUT : USU] RUb .,'-+-, Qc S_] ^QbUT d_ dXU dXbUU Q^T cYh]_^dXc U^TUT : USU] RUb .,'-+-+)$

;_b dXU dXbUU]_^dXe U^TUT 9USU] RUb . ,'			;_b dXU cYh] _^dXc U^TUT 9USU] RU				
-+-,	-+-+	8XQ^WU	8XQ^WU	-+-,	-+-+	8XQ^WU	**************************************
		7 UddUb*	L_bcU%			7UddUb*\$	L_bcU%
,'+2-	!,'+.+	! /-	/ "	! -',/4	! -'+	!,,2	1 "
0,4	//3	2,	,1 "	4-/	23+	,//	,3 "
04/	0	2,	,/ "	,',,3	41/	,0/	,1 "
.0-	-3,	2,					
	-+-, ,'+2- 0,4 04/	,'+2- ! ,'+.+ 0,4 //3 04/ 0	-+-, -+-+ 8XQ^WU 7UddUb* ,'+2- ! ,'+.+ ! /- 0,4 //3 2, 04/ 0 2,	-+-, -+-+ 8XQ^WU 8XQ^WU 7UddUb*\$L_bcU\(\) ,'+2- !,'+.+ ! /- / " 0,4 //3 2, ,1 " 04/ 0 2, ,/ "	-+-, -+-+ 8XQ^WU 8XQ^WU -+-, 7UddUb*\$L_bcU% ,'+2- !,'+.+ ! /- / " !-',/4 0,4 //3 2, ,1 " 4-/ 04/ 0 2, ,/ " ,',,3	-+-, -+-+ 8XQ^WU 8XQ^WU -+-, -+-+ 7UddUb*\$L_bcU% ,'+2- !,'+.+ ! /- / " !-',/4 !-'+ 0,4 //3 2, ,1 " 4-/ 23+ 04/ 0 2, ,/ " ,',,3 41/	-+-, -+-+ 8XQ^WU 8XQ^WU -+-, -+-+ 8XQ^WU 7UddUb*\$L_bcU% 7UddUb*\$,'+2- !,'+.+ ! /- / "!-',/4!-'+!,,2 0,4 //3 2, ,1 " 4-/ 23+ ,// 04/ 0 2, ,/ ",',3 41/ ,0/

IQR\U V 8 ^dU^dc

 $SYbSe\QdY_^ Q^T \ ceRcSbY`dY_^ bUfU^eUc \ Q^T \ dd \ dXU : _g \ @_^Uc \ cUW \] \ U^d `bY \] \ QbY\ i \ TeU \ d_XYWXUb \ QTfUbdYcY^W bUfU^eUc' XYWXUb \ SYbSe\QdY_^ Q^T \ ceRcSbY`dY_^ bUfU^eUc \ Q^T \ dXU \ QSaeYcYdY_^ _V ?8 :) \ JXU Y \] `QSd_V V_bUYW^ SebbU^Si \ V\eSdeQdY_^c _V \ dXU \ K)I) T_\Qb \ QWQY^cd \ _SQ\ SebbU^SYUc \ bUce\dUT Y^ Q \ bUfU^eU \ Y^SbUQcU _V !1 . \] \ Y\Y_^' _b , "'V_b \ dXU \ cYh \] _^dXc \ U^TUT : USU \] \ RUb . ,' -+- , Qc \ S_] `QbUT \ d_ dXU \ S_bbUc`_^TY^W `UbY_T _V \ VYcSQ\ -+- ,)$

 $JXU 9_] `Q^i SQ\Se\QdUc dXU Y] `QSd_V V_bUYW^SebbU^Si V\eSdeQdY_^c V_b RecY^UccUc bU`_bdY^W Y^SebbU^SYUc _dXUb dXQ^ dXU K)I) \\ T_\Qb Ri] e\dY^i Y^W dXU bUce\dc V_b UQSX aeQbdUb Y^ dXU SebbU^d `UbY_T Ri dXU TYVVUbU^SU RUdg UU^ dXU Q fUbQWU UhSXQ^WU bQdU V_b dXQd aeQbdUb Q^T dXU Q fUbQWU UhSXQ^WU bQdU Y^ UVVUSd TebY^W dXU S_bbUc`_^TY^W aeQbdUb _V dXU `bY_b i UQb Q^T d_dQ\Y^W dXU Y] `QSd V_b Q\\ aeQbdUbc Y^ dXU SebbU^d `UbY_T)$

6LBN>PFJD BTLBJ0B0 o E`UbQdY^W Uh`U^cUc Y^SbUQcUT !3,] Y\\Y_^'_b 2 "'Q^T !,1,] Y\\Y_^'_b 2 "'V_b dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb .,'-+-,'bUc`USdYfU\i'Qc S_] `QbUT d_ dXU S_bbUc`_^TY^W `UbY_Tc_V VYcSQ\ -+-,)

 $JXU \ Y^SbUQcU \ Y^- \ UbQdY^W \ Uh^`U^cUc \ V_b \ dXU \ dXbUU \] \ _^dXc \ U^TUT : USU \] \ Rub . , '-+- , \ g Qc `bY \] \ QbY_i \ TbYfU^R i \ XYWXUb \ Uh^`U^cUc \ Qd \ dXU \ 8 _ [FeR\YcXY^W \ cUW \] \ U^d \ TeU \ d_ \ dXU \ QSaeYcYdY_^ \ V > C > 8 _ [c Q^T \ CUTYQ' \ XYWXUb \ S_cdc \ bU\QdUT \ d_ Y^SbUQcUT \ cQ\ C \ L Q^T \ dXU \] \ Yh _V \ dYd\Uc Q^T \ Y^SbUQcUT \] \ Q^eVQSdebY^W \ Q^T \ VbUYWXd \ S_cdc \ UhQSUbRQdUT \ Ri \ ce``\i SXQY^ `bUccebUc) \ JXU \ Y \] \ QSd _V \ V_bUYW^SebbU^Si \ V\ eSdeQdY_^c _V \ dXU \ K) I) \ T_\Qb \ QWQY^cd \ _SQ\ SebbU^SYUc \ bUce\dUT \ Y^Q^E \ UbQdY^W \ Uh^`U^cU \ Y^SbUQcU _V \ ! . \] \ Y\\Y_^ \ V_b \ dXU \ dXbUU \] \ _^dXc \ U^TUT : USU \] \ RUb . , '-+- , \ Qc \ S_] \ QbUT \ d_ \ dXU \ S_bbUc^^TY^W \ `UbY_T _V \ Y'cSQ\ -+- ,)$

9BHHFJD" DBJBN>H >JA >A I FJF0PN>PFRB o IU\\Y^W' WU^UbQ\ Q^T QT] Y^YcdbQdYfU Y^SbUQcUT !,...] Y\\Y_^' _b ,3 "'Q^T !-41] Y\\Y_^' _b -, "'V_b dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb .,'-+-,' bUc`USdYfU\i'Qc S_]`QbUT d_ dXU S_bbUc`_^TY^W`UbY_Tc_V VYcSQ\ -+-,)

 $JXU\ Y^SbUQcU\ Y^cU\Y^W'\ WU^UbQ\ Q^T\ QT\ Y^YcdbQdYfU\ V_b\ dXU\ dXbUU\] _^dXc\ U^TUT\ : USU\]\ RUb\ .,'-+-,\ g\ Qc\ bY\]\ QbY\ i\ TbYfU^Ri\ Y^SbUQcUT\ Uh`U^cUc\ Qd\ dXU\ : YWYdQ\ HUQ\ ; cdQdU\ IUbfYSUc\ cUW\]\ U^d\ TeU\ d_dXU\ QSaeYcYdY_^c_V\ C_bdWQWU\ 9X_YSU\ Q^T\ ; QbQ\ gXYSX\ g\ Qc\ bURbQ^TUT\ d_H; 7\ ?^TYQW'\ XYWXUb\ U\] `_iUU\ S_cdc\ Qd\ R_dX\ C_fU\ Q^T\ H; 7=b_e` Q^T\ Y^SbUQcUT\]\ Qb[UdY^W\ Uh`U^cU\ Qd\ C_fU)\ JXU\ Y^SbUQcU\ g\ Qc\ Q\ C_TbYfU^Ri\ dXU\ : _g\ @_^Uc\ cUW\]\ U^d\ TeU\ d_dXU\ QSaeYcYdY_^ _V? 8: Q^T\ XYWXUb\ b_vUccY_^Q\ cUbfYSUc\ VUUc'\ Ri\ Y^SbUQcUT\]\ Qb[UdY^W\ Q^T\ dUSX^__Wi\ S_cdc\ Qd\ dXU\ IeRcSbY`dY_^ LYTU_IUbfYSUc\ cUW\]\ U^d'\ Ri\ XYWXUb\ S_cdc\ Qd\ dXU\ DU\ gc\ CUTYQ\ cUW\]\ U^d\ TeU\ d_Y^SbUQcUT\ bUfU^eUc\ Q^T\ Ri\ dXU\ QSaeYcYdY_^ _V > C > 8_[c\ Q^T\ CUTYQ)\ JXU\ Y\]\ QSd_V\ V_bUYW^SebbU^Si\ V\ eSdeQdY_^c_V\ dXU\ K)\ I)\ T_\Qb\ QWQY^cd\ _SQ\ SebbU^SYUc\ bUce\dUT\ Y^Q\ IU\\Y^W'\ WU^UbQ\ Q^T\ QT\]\ Y^YcdbQdYfU\ Y^SbUQcU_V\ !- \]\ Y\Y_-^V_b\ dXU\ dXbUU\] _^dXc\ U^TUT\ : USU\]\ RUb\ .,' -+-, Qc\ S_]\ QbUT\ d_dXU\ S_bbUc`_^TY^W\ `UbY_T _V VCSQ\ -+-,)$

 $JXU\ Y^SbUQcU\ Y^cU\\Y^W\ WU^UbQ\ Q^T\ QT\]\ Y^YcdbQdYfU\ V_b\ dXU\ cYh\]\ _^dXc\ U^TUT\ : USU\]\ Rub\ .\ ,'\ -+-\ ,\ gQc\ `bY\]\ QbY\ i\ TbYfU^Ri\ Y^SbUQcUT\ Uh\ U^cUc\ Qd\ dXU\ :\ YWYdQ\ HUQ\ ;\ cdQdU\ IUbfYSUc\ cUW\]\ U^d\ TeU\ d_dXU\ QSaeYcYdY_^c_V\ C_bdWQWU\ 9\ X_YSU\ Q^T\ H\ ;\ 7\ ?^TYQ'\ XYWXUb\ U\]\ `_iUU\ S_cdc\ Qd\ R_dX\ C_fU\ Q^T\ H\ ;\ 7\ =b_e\ Q^T\ Y^SbUQcUT\]\ Qb[UdY^W\ Uh\ U^cU\ Qd\ C_fU)\ JXU\ Y^SbUQcU\ gQc\ Q\ C_TbYfU^Ri\ dXU\ :_g\ Q_^Uc\ cUW\]\ U^d\ TeU\ d_dXU\ QSaeYcYdY_^U?\ 8\ :'XYWXUb\ `b_VUccY_^Q\ cUbfYSUc\ VUUc\ Q^T\ Y^SbUQcUT\ U\]\ `_iUU\ S_cdc'\ Ri\ XYWXUb\ S_cdc\ Qd\ dXU\ DUgc\ CUTYQ\ cUW\]\ U^d\ TeU\ d_dXU\ QTfUbcU\ !\ ,+\]\ Y\\Y_^Y\]\ `QSd_V\ V_bUYW^N\ SebbU^Si\ V\ eSdeQdY_^c\ Q^T\ Y^SbUQcUT\ U\ Q^T\ Ri\ dXU\ QSaeYcYdY_^U\ S_cdc\ Qd\ dXU\ IeRcSbY`\ dY_^LYTU_IUbfYSUc\ cUW\]\ U^d\ Q^T\ Ri\ dXU\ QSaeYcYdY_^U\ S_C>8_[c\ Q^T\ CUTYQ\ JXU\ Y\]\ `QSd_V\ V_bUYW^N\ SebbU^Si\ V\ eSdeQdY_^c\ U^dXU\ K)I)\ T_\\Qb\ QWQY^cd\ _SQ\ SebbU^SYUc\ bUce\dUT\ Y^Q\ UU\\Y^W\ UU^UbQ\ Q^T\ QT\]\ Y^YcdbQdYfU\ Y^SbUQcU_V\ !-\ ,\]\ Y\\Y_-\ b\ ,\ ''\ 'V_b\ dXU\ cYh\]\ _^dXc\ U^TUT\ :\ USU\]\ RUb\ .\ ,'\ -+-\ ,\ Qc\ S_]\ `QbUT\ d_dXU\ S_bbUc\ _^TY^N\ `UbY_T\ _V\ YCSQ\ -+-\ ,)$

, BLNB@F>PFKJ >JA > I KNPFV>PFKJ o : U`bUSYQdY_^Q^TQ]_bdYjQdY_^Uh`U^cU Y^SbUQcUT!,]Y\\Y_^'_b, "'Q^T!-]Y\\Y_^'_b, "'V_b dXU dXbUU Q^T cYh]_^dXc U^TUT: USU]RUb.,'-+-,'bUc`USdYfU\i'QcS_]`QbUT d_dXU S_bbUc`_^TY^W `UbY_Tc_V VYcSQ\-+-,)

- $JXUY]^\circ QSd_VV_bUYW^SebbU^SiV_eSdeQdY_^c_VdXUK)I)T__(QbQWQY^cd_SQ)SebbU^SYUcbUce_dUTY^QTU^bUSYQdY_^Q^TQ)_bdYjQdY_^Uh^U^cUY^SbUQcU_V^YQ^T!.]Y_(Y_b, "'V_bdXUdXbUUQ^TcYh]_^dXcU^TUT:USU]RUb.,'-+-,'bUc^USdYfU_i'QcS_]^0bUTd_dXUS_bbUc^^TY^W^UfY_C_VYCSQ\-+-,)$
- $11L > FN \ IBJP > JA \ NBOPNQ@PQNFJD @E > NDBO \ o : eby^W \ dXU \ dXbUU \ Q^T \ cyh \] _^dXc \ U^TUT : USU \] \ RUb . , '-+- , ' \ dXU \ 9 _] ` Q^i \ bUS_bTUT \ bUcdbe Sdeby^W \ SXQbWUc _V !- .] \ Y\\Y_^' \ bUc ` USdyfU\i) : eby^W \ dXU \ dXbUU \ Q^T \ cyh \] _^dXc \ U^TUT : USU \] \ RUb . , '-+-+' \ dXU \ 9 _] ` Q^i \ bUS_bTUT \ bUcdbe Sdeby^W \ SXQbWUc _V !- .] \ Y\\Y_^ \ Q^T !1 .] \ Y\\Y_^' \ bUc ` USdyfU\i) \ IUU \ D_dU / \ o \ HUcdbe Sdeby^W \ Fb_WbQ \] \ c \ Y^ \ dXU \ QSS_] ` Q^i \ YW \ 9 _^c_\YTQdUT < Y^Q^SYQ\ \ IdQdU \ U \ O \ DAU \ O \ O \ DAU \ O \ O \ DAU \ O \ O$
- $\textit{MQFPU HK00B0 KC} > \textit{CCFHF} > \textit{PBO} \ o \ ; \ ae'di \ \ccuc \ \V \ \V'Y\ \Cduc \ \Y' \ \SbUQcut \ Ri \ ! . \] \ \V'Y\ \Cduc \ \V'Y\ \V'$
- 1JPBNBOP BTLBJOB" JBP o ?^dUbUcd Uh`U^cU' ^Ud Y^SbUQcUT Ri !4] Y\\Y_^ Q^T !-.] Y\\Y_^ V_b dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb .,'-+-,' bUc`USdYfU\i'Qc S_] `QbUT d_ dXU S_bbUc`_^TY^W `UbY_Tc _V VYcSQ\ -+-,' `bY] QbY\i TbYfU^ Ri dXU YcceQ^SU _V !, RY\\Y_^ V cU^Y_b ^_dUc Y^ dXU V_ebdX aeQbdUb _V VYcSQ\ -+-, \$dXU p-+-, IU^Y_b D_dUcq%)

- $<_b\ dXU\ cYh\]\ _^dXc\ U^TUT\ :USU\]\ RUb\ .\ ,'\ -+-\ ,'\ dXU\ 9_\]\ ^Q^i\ bUS_bTUT\ Y^S_\]\ U\ dQh\ Uh\ U^cU_V\ !\ ,2+\]\ Y\\Y_^-\ ^bU(dQh\ Y^S_\]\ U_V\ !\ 144\]\ Y\\Y_^'\ bUce\dY^W\ Y^Q^UVVUSdYfU\ dQh\ bQdU\ dXQd\ g\ Qc\ XYWXUb\ dXQ^\ dXU\ K)I)\ cdQded_bi\ dQh\ bQdU)\ JXU\ dQh\ bQdU\ g\ Qc\ Y\]\ ^QSdUT\ Ri\ V_bUYW^-\ _`UbQdY_^c\ g\ XYSX\ QbU\ ceRZUSd\ d_XYWXUb\ dQh\ bQdUc\ Q^T\ SXQ^WUc\ Y^fQ\eQdY_^Q_g\ Q^SUc'\ _VVcUd\ Ri\ dXU\ _g\ Ub\ dQh\ Y\]\ ^QSd\ bU\QdUT\ d_dXU\ QSaeYcYdY_^-\ _V\ Q^,\ 3"\ Y^dUbUcd\ Y^Fb_`Ubdi=ebe)$
- $<_b \ dXU \ dXbUU \] _^dXc \ U^TUT : USU \] \ RUb . , '-+-+' \ dXU \ 9 _] ^Q^i \ bUS_bTUT \ Y^S_] \ U \ dQh \ Uh^U^cU _V ! 30 \] Y\\Y_^ _^ `bU(dQh \ Y^S_] \ U \\ _V ! . / 1 \] Y\\Y_^' bUce\dY^W Y^ Q^ UVYUSdYfU \ dQh \ bQdU \ dXQd \ gQc XYWXUb \ dXQ^ dXU \ K)I) \ cdQded_bi \ dQh \ bQdU \ JXU XYWXUb \ dQh \ bQdU \ gQc \\ `bY] QbY\i TeU \ d_ fQ\eQdY_^ Q_g Q^SUc RUY^W \ bUS_bTUT \ QWQY^cd \ dQh \ RU^UYYdc Y^ SUbdQY^ V_bUYW^ ZebYcTYSdY_^c g YdX _`UbQdY^W _ccUc Q^T \ dXU Y] `QSd _V V_bUYW^ _`UbQdY_^c g XYSX \ QbU \ ceRZUSd \ d_ XYWXUb \ dQh \ bQdUc' _VVCUd R i Q bU] \ UQcebU] \ U^d _V TUVUbbUT \ dQhUc Y^ \ dXU \ K)A)$
- <_b dXU cYh] _^dXc U^TUT : USU] RUb . ,' -+-+' dXU 9 _] `Q^i bUS_bTUT Y^S_] U dQh Uh` U^cU _V ! , , +] Y\\Y_^ ^ `bU(dQh Y^S_] U _V !/ , 3] Y\\Y_^' bUce\dY^W Y^ Q^ UVVUSdYfU dQh bQdU dXQd g Qc XYWXUb dXQ^ dXU K)I) cdQded_bi dQh bQdU) JXU XYWXUb dQh bQdU g Qc `bY] QbY\i TeU d_ fQ\eQdY_^ Q_g Q^SUc RUY^W bUS_bTUT QWQY^cd dQh RU^UVYdc Y^ SUbdQY^ V_bUYW^ ZebYcTYSdY_^c g YdX _`UbQdY^W _ccUc Q^T dXU Y] `QSd _V V_bUYW^ _`UbQdY_^c g XYSX QbU ceRZUSd d_ XYWXUb dQh bQdUc' _VVcUd Ri Q bU] U^d _V TUVUbbUT dQhUc Y^ dXU K)A)</pre>
- C Q^QWU] U^d QccUccUc QfQY\QR\U UfYTU^SU d TUdUb] Y^U gXUdXUb ceVYYSYU^d VedebU dQhQR\U Y^S] U gY\\ RU WU^UbQdUT d `Ub] Yd dXU

 $<_b\ dXU\ cYh\]_^dXc\ U^TUT\ : USU\]\ RUb\ .\ ,'-+-,'\ bUfU^eUc\ Qd\ dXU\ I\ eRcSbY`dY_^\ LYTU_\ IUbfYSUc\ cUW\]\ U^d\ Y^SbUQcUT\ !\ ,\]\ Y\\Y_^Qc\ S__]`QbUT\ d_dXU\ S_bbUc`_^TY^W`UbY_T_V \ YCSQ\ -+-,'\ Qc\ dXU\ !O-]\ Y\\Y_^Y^SbUQcU\ Y^c\ cdbUQ\]\ Y^W\ bUfU^eUc'`bY\]\ QbY\ i\ V_b_]\ AQi_Q^T\ I8<64'\ dXU\ `_cYdYfU\ Y]`QSd_V \ V_bUYW^SebbU^Si\ V\eSdeQdY_^c\ Q^T\ XYWXUb\ QTFUbdYcY^W\ bUfU^eUc\ g\ UbU_\ VVcUd\ Ri\ _g\ UbU\ bUcYTU^dYQ\ ceRcSbY`dY_^b\ bUfU^eUc\ bUce\dY^W\ Vb_]\ VUg\ Ub\ bUcYTU^dYQ\ Rb_QTSQcd\ ceRcSbYRUbc\ Q^T\ dXU\ !3\]\ Y\\Y_^T\ TUS\Y^U\ Y^S_]\ UbSYQ\ ceRcSbY`dY_^b\ UfU^eUc\ TeU\ d_\ bUSU^d\ 9\ EL?:\ (,4\ bU\QdUT\ bUcdbYSdY_^c\ g\ YdXY^SUbdQY^c\ cdQdUc\ Y^7\ 7\ ecdbQ\YQ\ <\byleq \ CdV\ Y^S\ DUfU^eUc\ V_b\ CYh\]\ _dXc\ U^TUT\ :\ USU\]\ RUb\ .\ ,'-+-\ ,\ JXU\ Y\]\ QSd_\ V\ _bUYW^S\ SebbU^Si\ V\ eSdeQdY_^c\ _V\ dXU\ K\]\ T\ _\\Qb\ QWQY^cd\ _SQ\ SebbU^SYUc\ bUce\dUT\ Y^Q\ bUfU^eU\ Y\ SbUQcU\ _V\ !\ 1\]\ Y\\Y_^'\ _b\ ,\ ''\ _b\ dXU\ CYh\]\ _dXc\ U^TUT\ :\ USU\]\ RUb\ .\ ,'-+-\ ,\ Qc\ S_]\ QbUT\ d_\ dXU\ S_bbUc`_^TY^W\ UbY_T\ _V\ YCSQ\ -+-\ ,\)$

<_b dXU cYh] _^dXc U^TUT : USU] RUb . ,' -+- ,' IUW] U^d ; 8?J : 7 TUSbUQcUT !-] Y\\Y_^' _b , "'Qc S_] `QbUT d_ dXU S_bbUc`_^TY^W `UbY_T _V VYcSQ\ -+- ,' `bY] QbY\i TeU d_ XYWXUb Y^fUcd] U^d c`U^TY^W _^ cdbUQ] Y^W `b_TeSdc'] QY^\i Y^] Qb[UdY^W' XYWXUb dUSX^_\Wi S_cdc Q^T XYWXUb c`_bdc `b_WbQ]] Y^W bYWXdc S_cdc Y^ dXU SebbU^d `UbY_T TeU d_ dXU dY] Y^W _V ^_S_] `QbQR\U

	;_b dXU	;_b dXU dXbUU]_^dXc U^TUT 9USU] RUb .,'			;_b dXU c\h]_^dXc U^TUT 9USU] RUb .,'			
	-+-,	-+-+	8XQ^WU	" 8XQ^WU	-+-,	-+-+	8 XQ^WU	" 8XQ^WU
\$Y^] Y\\Y_^c' UhSU`d '' %			7 UddUb	*\$ L _bcU%			7 UddUb	*\$ L _bcU%
HUfU^eUc5								
9 YbSe\QdY_^ Q^T ceRcSbY`dY_^	! .01	! .,4	! .2	, - "	! 2+0	! 1.+	! 20	, - "
7TfUbdYcY^W	,/,	, ,0	-1	"	,	,30	/1	-0 "
EdXUb	,		\$,%	\$3% "	,1	,2	\$,%	\$1%"
I_dQ\ GUfU^eUc	0+3	//1	1-	,/ "	40-	3	,-+	,/ "
E`UbQdY^W Uh`U^cUc	\$,41%	\$,44%		- "	\$.4-%	\$.3/%	\$3%	\$-%"
IU\\Y^W' WU^UbQ\ Q^T QT] Y^YcdbQdYfU	\$,13%	\$,.3%	\$.+%	\$%"	\$,%	\$-12%	\$0/%	\$-+% "
HUW]U^d:7>I96	! ,//	! ,+4	! .0	"	!4	! ,3,	! 03	"

 $<_b\ dXU\ cYh\]_^dXc\ U^TUT\ : USU\]\ RUb\ .\ ,'\ -+-\ ,'\ bUfU^eUc\ Qd\ dXU\ :_g\ @_^Uc\ cUW\]\ U^d\ Y^SbUQcUT\ !\ ,-+\]\ Y\Y_-'\ _b\ ,/\ ''\ 'Qc\ S_]\ ^QbUT\ d_dXU\ S_bbUc\ _^TY^W\ ^UbY_T\ _V\ Y'cSQ\ -+-\ ,'\ ^bY\]\ QbY\ i\ TbYfU^R\ i\ XYWXUb\ QTfUbdYcY^W\ bUfU^eUc\ dXU\ Y^SbUQcU\ Y^SYbSe\QdY_^Q^T\ ceRcSbY^dY_^bUfU^eUc\ Q^T\ dXU\ !\ .\]\ Y\Y_-^Y\]\ ^QSd\ Vb_]\ dXU\ QSaeYcYdY_^U^?8\ :)\ :YWYdQ\ bUfU^eUc\ Qd\ dXU\ :_g\ @_^Uc\ cUW\]\ U^d\ bUcU^dUT\ 2\ .\ ''\ _V\ d_dQ\ bUfU^eUc\ V_b\ dXU\ cYh\]\ _^dXc\ U^TUT\ :USU\]\ RUb\ .\ ,'\ -+-\ ,$

 $JXU\ V_\setminus gY^W\ dQR\setminus U\ ce\]\]\ QfUbQWU\ TQY\setminus i\ S_^ce\]\ Ub\ ceRcSbY^dY_^c\ TebY^W\ dXU\ dXbUU\]\ _^dXc\ U^TUT\ :\ USU\]\ RUb\ .\ ,'-+-\ ,\ Q^T\ -+-+\ V_b\ cU\setminus USd\ ^eR\setminus SQdY_^c\ Q^T\ V_b\ Q\setminus S_^ce\]\ Ub\ ceRcSbY^dY_^c\ b_TeSdc)^{SQN}$

;_b dXU dXbUU]_^dXc U^TUT 9USU] RUb ., \$R\\\ " 8XQ^WU -+-, 8XQ^WU \$Y^ dX_ecQ^Tc' UhSU`d "% 7UddUb*\$ L_bcU% BNK EGRR AZXKKZ 9U[XTGR : $YWYdQ\(_^\i ceRcSbY\dY_^c^{SS\%}$,4 " -'/1-/01 -'4,3 J_dQ\ ceRcSbY`dY_^c , - " .'1,3 .'--/ .4/ $8 \text{Qbb_^rc} = b_e^{\$T\%}$: $YWYdQ\(_^\i ceRcSbY\idy_^c$ \$S% 202 044 ,03 -1" J_dQ\ ceRcSbY\dY_^c 41. ,0/ ,4 " 3+4 $J_dQ = -ce$] Ub^{\$U%} : $YWYdQ\(_^\i ceRcSbY\i_^c$ \$S% .'22/ .'+1, 2,. -." $J_dQ\ ceRcSbY\ dY_^c$ /'2+2/'+.. 12/ ,2 "

*KKG 7Q?\(TOZE\(JD \) \\$-- " _V \(dXU \) 9_] `Q^irc S_^c_\\(TQdUT \) \(bUfU^eUc \) \(R_dX \) \(dXU \) \(c\) \(h \) __^dXc \(U^TUT : USU \) \(RUb \) . , '-+- , \(Q^T -+-+\)

	;_b dXU dXbUU]_^dXc U^TUT 9USU] RUb .,'			;_b dXU cYh]_^dXc U^TUT 9USU] RUb .,'				
	-+-,	-+-+	8XQ^WU	'' 8XQ^WU	-+-,	-+-+	8XQ^WU	" 8XQ^WU
\$Y^] Y\\Y_^c' UhSU`d "%			7 UddUb	*\$ L _bcU%			7 UddUb	*\$ L _bcU%
HUfU^eUc5								
9_^ce] Ub	! 04/	! 0	! 2,	,/ "	!,',,3	! 41/	! ,0/	,1 "
EdXUb		-,		,+ "	/0	.3	2	,3 "
I_dQ\ GUfU^eUc	1,2	0//	2.	,. "	,',1.	,'++-	,1,	,1 "
E`UbQdY^W Uh`U^cUc	\$/,,%	\$./2%	\$1/%	\$,3%"	\$223%	\$10,%	\$,-2%	\$-+% "
$IU\backslash\backslash Y^W'WU^UbQ\backslash Q^TQT]Y^YcdbQdYfU$	\$44%	\$4.%	\$1%	\$1% "	\$,4.%	\$,21%	\$,2%	\$,+%"
HUW] U^d: 7>I96	! ,+2	! ,+/	! .	. "	! ,4-	! ,20	! ,2	,+ "

5BS0 4BAF>\$-/"_V dXU 9_]`Q^irc S_^c_\TQdUT bUfU^eUc Y^ R_dX dXU cYh]_^dXc U^TUT : USU] RUb .,'-+-, Q^T -+-+%

 $: ebY^W dXU cYh \] _^dXc \ U^TUT : USU \] \ RUb . , '-+-+' dXU \ 9 _] \ ^Q^i bU^QYT \ !-/3 \] \ Y_{Y^-} V \ R_bb _gY^Wc bU_QdUT \ d < hdU_Q^T \] \ QTU \ TYfYTU^T \ ^Qi \] \ U^dc _V \ !3+ \] \ Y_{Y^-} \ d _DUgc \ 9_b \ bQdY_^ cd_S[X_TUbc \ Q^T H ; 7 = b_e \] \ Y^-bYdi \ cd_S[X_TUbc) \ JXU \ ^Ud \ SQcX \ ecUT \ Y^Q^SY^W \ QSdYfYdYUc \ V_b \ dXU \ cYh \] _^dXc \ U^TUT : USU \] \ RUb . , '-+-+ gQc \ ^QbdYQ_i \ _VVcUd \ Ri \ ^Ug \ R_bb_gY^Wc \ bU_QdUT \ d_<_hdU_V \ ! , /1 \] \ Y_{Y^-}$

8B@KJ@FHF>PFKJ KC . NBB +>0E . HKS) R>FH>?HB PK 5BSO +KNLKN>PFKJ

< K] Y 2 UXV 1 UXXU] 0 TMY

 $7\,c\,_V\,:\,USU\,]\,RUb\,.\,,'\,-+-\,,'\,dXU\,9\,_\,]\,^Q^i\,XQT\,R_bb\,_g\,Y^Wc\,_V\,!\,431\,\,]\,Y\setminus Y_^\prime\,g\,XYSX\,S_^cYcdUT\,_V\,dXU\,SQbb\,i\,Y^W\,f\,Q\setminus U\,_V\,Ydc\,-+-\,,\,I\,U^Y_b\,D_dUc)$

5U^ZKR 6XU[V 1UXXU]0TMY

7 c _V : USU] RUb .,' -+-,

`UbQdY^c) JXU 9_] `Q^irc S_]] \[d] U^dc Qc_V : USU] RUb . ,' -+- , XQfU ^_d SXQ^WUT c\[V^YVYSQ^d\[i Vb_] dXU T\[cS_cebUc V^S\eTUT Y^ dXU -+- , <_b] ,+(A)

+KJPFJDBJ@FBO

 $JXU 9_] `Q^i b_edY^U i Yc Y^f_fUT Y^ fQbY_ec \UWQ `b_SUUTY^Wc' SQY] c Q^T W_fUb^] U^dQ Y^c `USdY_^c _b Y^fUcdYWQdY_^c' Y^SeTY^W dX_cU TYcSeccUT Y^ D_dU , + d_ dXU 9_^c_YTQdUT < Y^Q^SYQ IdQdU] U^dc) JXU _edS_] U _V dXUcU] QddUbc Q^T SQY] c Yc Yc Yc Y^SQY [Continuous for the first of the$

$E6GI \gg$

>I:B, A:<6AEGD8::9>C<H

 $IUU \ D_dU \ , +o \ 9_] \] \ Yd \] \ U^dc \ Q^T \ 9_^dY^WU^SYUC \ Y^dXU \ QSS_] \ `Q^iY^W \ 9_^c_Y^TQdUT < Y^Q^SYQ \ I \ dQdU \] \ U^dc)$

>I:B,6)G>H@;68IDGH

 $JXUbUXQfURUU^{\ \ }_{\ \ } QdUbYQ\ SXQ^WUcd_dXUbYc[VQSd_bcTUcSbYRUTY^dXU-+-,<_b] \ , +(A'UhSU'dQccUdV_bdXRU_g5)$

: EB +KIL>JU 8BHFBO KJ 5BPSKNG > JA 1JCKN I > PFKJ 9UOPB I 0 > JA 6PEBN : B@EJKHKDU = EKOB . > FHQNB KN 4FQQOB + KQHA + > QOB > , FONQLPFKJ KC 9BNRF@BO KN 3KOO" 1 I LNKLBN) @@BOO PK KN , FO@HKOQNB KC 7BNOKJ>H , > P>" *QOFJBOO 1JCKN I > PFKJ" 1J@HQAFJD 1JPBHB@PQ>H 7NKLBNPU" KN 6PEBN +KJCFABJPF>H 1JCKN I > PFKJ" 8BOQHPFJD FJ 1J@NB>OBA + KOPO" 3KOO KC 8BRBJQB" 8BLQP>PFKJ>H , > I > DB KN 6PEBN O > N I PK PEB + K I L > JUYO *QOFJBOO\$

DUdg_b[Q^T Y^V_b] QdY_^cicdU] c Q^T _dXUb dUSX^_\WYUc' Y^S\eTY^W dX_cU bU\QdUT d_ dXU 9_] `Q^irc S_^dU^d TU\YfUbi ^Udg_b[c Q^T ^Udg_b[] Q^QWU] U^d' QbU Y] `_bdQ^d d_ Ydc RecY^Ucc QSdYfYdYUc Q^T S_^dQY^ dXU 9_] `Q^irc `b_`bYUdQbi' S_^VYTU^dYQ\ Q^T cU^cYdYfU RecY^Ucc Y^V_b] QdY_^' Y^S\eTY^W `Ubc_^Q\ TQdQ_V Ydc Secd_] Ubc Q^T `Ubc_^^U\) JXU 9_] `Q^i Q\c_bU\YUc_^ dXYbT(`Qbdi `b_fYTUbc V_b SUbdQY^ dUSX^_\wi Q^T pS_eT(RQcUTq cicdU] c Q^T cUbfYSUc dXQd ce``_bd Q fQbYUdi _V RecY^Ucc _`UbQdY_^c) ?^
@Q^eQbi -+--' dXU 9_] `Q^i TYcS_fUbUT dXQd _^U _V dXUcU cicdU] c gQc dXU dQbWUd_V `UbcYcdU^d SiRUbQddQS[QSdYfYdi) J_WUdXUb gYdX Q^_edcYTU SiRUbcUSebYdi VYb]' dXU 9_] `Q^i Yc S_^TESdY^W Q^ Y^fUcdYWQdY_^ Y^d_ dXU SYbSe] cdQ^SUc_V dXU QSdYfYdi d_TUdUb] Y^U Ydc ^QdebU' cS_`U' TebQdY_^ Q^T Y] `QSdc) JXU 9_] `Q^irc `bU\Y] Y^Qbi Q^Q\icYc Y^TYSQdUc dXQd V_bUYW^ W_fUb^] U^d Y^f_\fU] U^d] Qi RU Qcc_SYQdUT gYdX dXYc QSdYfYdi' Q^T dXQd TQdQ gQc dQ[U^) J_dXU 9_] `Q^irc [^_g\UTWU' Ydc cicdU] c X_ecY^W Secd_] Ub Q^T YY^Q\SYQ\ TQdQ gUbU ^_d QWUSdUT) JXU 9_] `Q^i Yc bU] UTYQdY^W dXU YcceU' Q^T d_TQdU XQc ^_d Uh`UbYU^SUT Q^i bU\QdUT Y^dUbbe`dY_^c d_Ydc RecY^Ucc_`UbQdY_^c b cicdU] c) 8QcUT_^ Ydc Y^fUcdYWQdY_^d_T d_TQdU XQc ^_d Uh`UbYU^SUT Q^i bU\QdY Y^fUcdYWQdY_^ Q^T bU] UTYQdY_^UT) 7d dXYc dY] U' dXU 9_] `Q^i Yc e^QR\U d_UcdY] QdU dXU Uh`U^cUc Yd gY\\Y^Seb Y^S_^USeb Y^S_^USdY_^ gYdX Ydc Y^fUcdYWQdY_^ Q^T bU] UTYQdY_^ UW_bdc)

DUdg_b[Q^T Y^V_b] QdY_^cicdU] c(bU\QdUT UfU^dc QWVUSdY^W dXU 9_] `Q^irc cicdU] c'_b dX_cU__V dXYbT `QbdYUc e`_^ gXYSX dXU 9_] `Q^irc RecY^Ucc bU\YUc' ceSX Qc S_] `edUb S_] `b_]YcUc' SiRUb dXbUQdc Q^T QddQS[c' S_] `edUb fYbecUc' g_b] c_b_dXUb TUcdbeSdYfU_b TYcbe`dYfU_c VdgQbU' `b_SUcc RbUQ[T_g^c' bQ^c_] gQbU Q^T TU^YQ_V cUbfYSU QddQS[c'] Q\YSY_ec c_SYQ\ U^WY^UUbY^W _b_dXUb] Q\YSY_ec QSdYfYdYUc Ri Y^TYfYTeQ\c_b cdQdU(c`_^c_bUT_b_dXUb Wb_e`c'_b Q^i S_] RY^QdY_^ V dXU V_bUW_Y^W' Qc gU\\ Qc `_gUb Q^T Y^dUb^Ud_edQWUc' UaeY`] U^d VQY\ebU' ^QdebQ\ TYcQcdUbc' Y^S\eTY^W UhdbU] U gUQdXUb \$gXYSX] Qi_SSeb gYdX Y^SbUQcY^W VbUaeU^Si Q^T Y^dUb^Cydi* dUbb_bYcd QSdYfYdYUc' gQb' Xe] Q^_b dUSX^_\WYSQ\ Ubb_b_b] Q\YUQcQ^SU dXQd] Qi QWVUSd ceSX cicdU] c' S_e\T bUce\dY TYcbe`dY_^ V dXU 9_] `Q^irc cUbfYSUc Q^T RecY^Ucc Q^T*_b _cc' S_bbe`dY_^'Y] `b_`Ub QSSUcc d__b TYcS_cebU_V `Ubc_^Q\ TQdQ' RecY^Ucc Y^V_b] QdY_^ Y^V_b QAUV\USdeQ\ `b_`Ubdi'_b _b XUb S_^VYTU^dYQ\ Y^V_b] QdY_^ Y^_bYUT `QbdYUc] Qi Q\c_VbQeTe\U^d\i Y^TESU dXU 9_] `Q^irc U] `_iUUc_b _dXUb QWU^dc d_TYcS_cU cU^cYdYfU_b S_^VYTU^dYQ\ Y^V_b] QdY_^ Y^_bTUb d WQY^ QSSUcc d_dXU 9_] `Q^irc cicdU] c' VQSY\YdYUc_b TQdQ'_b dX_cU_V dXYbT `QbdYUc gYdX gX_] dXU 9_] `Q^i T_Uc RecY^Ucc) ?^A QTTYdY_^ Q^i TUcYW^_b] QdY_^ CUSebYdi) IicdU] bUTe^TQ^Si] Qi RU Y^UVUSdYfU_b Y^QTUaeQdU' Q^T dXU 9_] `Q^irc TYcQcdUb bUS_fUbi Q^T RecY^Ucc S_^dY^eYdi `\Q^^Y^V_b] QdY_^ cuSebYdi) IicdU] bUTe^TQ^Si] Qi RU Y^UVUSdYfU_b Y^QTUaeQdU' Q^T dXU 9_] `Q^irc TYcQcdUb bUS_fUbi Q^T RecY^Ucc S_^dY^eYdi `\Q^^Y^V_b] QdY_^ cuSebYdi) IicdU] bUTe^TQ^Si] Qi RU Y^UVUSdYfU_b Y^QTUaeQdU' Q^T dXU 9_] `Q^irc TYcQcdUb bUS_fUbi Q^T RecY^Ucc S_^dY^eYdi `\Q^^Y^V_b] QdY_^ cuSebYdi) IicdU] bUTe^TQ^Si] Qi RU YTDUcc Q\\ `_dU^dY\SiRUb UfU^dc_b _dXUb TYcbe`dY_^c

?^bUSU^d i UQbc' dXUbU XQc RUU^Q cYW^YYYSQ^d bYcU Y^dXU ^e] RUb_V SiRUbQddQS[c_^S_]`Q^YUcr^Udg_b[Q^T Y^V_b]QdY_^cicdU]c' $Q^T ceSX QddQS[c QbU RUS_] Y^W Y^SbUQcY^W i] _bU c_XYcdYSQdUT' dQbWUdUT Q^T TYVVYSe \ d_TUdUSd Q^T `bUfU^d QWQY^cd) \ 7c Q bUce \ d_TUdUSd Q^T `bUfU^d QWQY^cd) \ 7c Q bUce \ d_TUdUSd Q^T `bUfU^d QWQY^cd) \ 7c Q bUce \ d_TUdUSd Q^T `bUfU^d QWQY^cd) \ 7c Q bUce \ d_TUdUSd Q^T `bUfU^d QWQY^cd) \ 7c Q bUce \ d_TUdUSd Q^T `bUfU^d QWQY^cd) \ 7c Q bUce \ d_TUDUSd Q^T \ bUfU^d Q^T \ bUfU$ _V dXU 9 EL?:(,4 `Q^TU] YS' bU]_dU g_b[Q^T bU]_dU QSSUcc d_ dXU 9_]`Q^irc cicdU]c XQc Y^SbUQcUT cYW^YYYSQ^d\i' g XYSX] Qi QTfUbcU\i Y]`QSd dXU UVVUSdYfU^Ucc _V dXU 9_]`Q^irc cUSebYdi]UQcebUc) 9_^cUaeU^d\i' dXU bYc[c Qcc_SYQdUT gYdX ceSX Q^ UfU^d S_^dY^eU d_ Y^SbUQcU' `QbdYSe\Qb\i Qc dXU 9_] `Q^irc TYWYdQ\ RecY^UccUc Uh`Q^T) JXU 9_] `Q^i XQc Uh`UbYU^SUT' Q^T Uh`USdc d_ S_^dY^eU d_ RU ceRZUSd d_' SiRUbcUSebYdi dXbUQdc Q^T QSdYfYdi) JXUbU Yc ^_ QccebQ^SU dXQd SiRUbcUSebYdi dXbUQdc _b QSdYfYdi ceSX Qc dXQd TYcS_fUbUT Y^ @Q^eQbi -+-- g Y\\ ^_d XQfU Q] QdUbYQ\ QTfUbcU UVVUSd Y^ dXU VedebU) 9_e^dUb] UQcebUc dXQd dXU 9_] `Q^i Q^T Ydc fU^T_bc XQfU TUfU_`UT Q^T Y] `\U] U^dUT d_ `b_dUSd `Ubc_^Q\ TQdQ' RecY^Ucc Y^V_b] QdY_^' Y^S\eTY^W Y^dU\\USdeQ\ `b_`Ubdi' Q^T _dXUb_S_^VYTU^dYQ\ Y^V_b] QdY_^' d_ `bUfU^d cicdU] TYcbe`dY_^' TQdQ _cc _b S_bbe`dY_^' Q^T d_ `bUfU^d _b TUdUSd cUSebYdi RbUQSXUc] Qi ^_d RU ceSSUccVe\ Y^ `bUfU^dY^W dXUcU UfU^dc' `QbdYSe\Qb\ i WYfU^ dXQd dUSX^YaeUc ecUT d_ QSSUcc' TYcQR\U _b TUWbQTU cUbfYSU' _b cQR_dQWU cicdU]c SXQ^WU VbUaeU^d\i) 7TTYdY_^Q\\i' Yd]Qi RU TYYVYSe\d d_ TUdUSd Q^T TUVU^T QWQY^cd SUbdQY^ dXbUQdc Q^T $fe \land DbQRY \land dXQdSQ^ \land UbcYcd_fUbUhdU^TUT \land UbY_Tc_VdY]U) \ 7^i \land Udg_b[Q^TY^V_b]QdY_ \land cicdU]c (bU \land QdUTUfU^dcS_e \land The first open for the fir$ bUaeYbU dXU 9_]`Q^i d_Uh`U^T cYW^YYYSQ^d bUc_ebSUc d_ bU] UTi ceSX UfU^d) C_bU_fUb' dXU TUfU_`] U^d Q^T] QY^dU^Q^SU_V dXUcU] UQcebUc Yc S_cd\i Q^T bUaeYbUc _^W_Y^W] _^Yd_bY^W Q^T e`TQdY^W Qc dUSX^__WYUc SXQ^WU Q^T UVV_bdc d_ _fUbS_] U cUSebYdi] UQcebUc RUS_] U]_bU c_`XYcdYSQdUT) MXY\U dXU 9_] `Q^i] QY^dQY^c SiRUb bYc[Y^cebQ^SU' dXYc Y^cebQ^SU] Qi ^_d RU ceVYYSYU^d d_S_fUb Q_ccUc Vb_] Q^i RbUQSXUc_V dXU 9_] `Q^irc cicdU] c Q^T T_Uc ^_d UhdU^T d_ bU`edQdY_^Q\ TQ] QWU _b S_cdc Y^SebbUT d_ Y]`b_fU_b cdbU^WdXU^ cicdU]c QWQY^cd VedebU dXbUQdc_b QSdYfYdi)9iRUb bYc[Y^cebQ^SU XQc Q\c_RUS_]U]_bU TYVVYSe\d Q^T

IQR\U V 8 ^dU^dc

$>I:B\ 1):M=>7>IH$

\$Q%; hXYRYdc)

- -), 7 | U^TUT Q^T HUCdQdUT <EN IFEHJI JbQTU CQb[BYSU^cU 7WbUU] U^d' TQdUT Qc V ESd RUb --' -+- ,' RUd g UU^ < h CUTYO BB9 O^T < h I` bdc 7 ecdbQ\YO Fdi BY] \dUT)&
- -)- 7] U^TUT Q^T HUcdQdUT <EN JbQTU CQb[BYSU^cU 7WbUU] U^d' TQdUT Qc V ESd RUb --' -+- ,' RUdgUU^ < h CUTYQ BB9 Q^T < h I`_bdc 7 ecdbQ\YQ Fdi BY] YdUT)&
- -)/ $\frac{7 \,] \, U^T U T \, Q^T \, H U c d Q d U T \, < E N \, J \, b Q T U \, C \, Q b \, [\, B Y S U^c U \, 7 \, W b U U \,] \, U^d ' \, T Q d U T \, Q c \, V \, E S d \, R U b \, --' \, -+- \, , ' \, R U d \, g \, U U^c \, < \, h \, C \, U T Y Q \, B B 9 \, Q^T \, < \, h \, d U V \, C \, Q^Q W U \,] \, U^d \, F d \, i \, B Y \,] \, Y d U T \& k$
- ,+), 7] U^T] U^d D), 'TQdUT Qc V D fU] RUb ,1' -+- ,'d dXU 9bUTYd 7WbUU] U^d' TQdUT Qc V : USU] RUb ,-' -+ ,4' Q] ^W DUgc 9 b` bQdY ^ Qc R bb gUb' dXU cUfUbQ\ RQ^[c Q^T dXUb YY^Q^SYQ\ Y^cdYdedY ^c b U^dYdYUc Vb] dY] U d dY] U `QbdYUc dXU 9bUTYd 7WbUU] U^d' @FC bWQ^ 9XQcU 8Q^['D)7) Qc QT] Y^YedbQdYfU QWU^d' Q^T dXU dXUb `QbdYUc dXUbUd)&
- .,), 9XYUV; hUSedYfU EVVYSUb 9UbdYVYSQdY ^ bUaeYbUT Ri He\Uc ,.Q(,/Q^T ,OT(,/e^TUb dXU IUSebYdYUc; hSXQ^WU 7 Sd V ,4./'Qc Q] U^TUT)&
- .,)- 9XYUV <\^Q^SYQ\ EVY\SUb 9Ubd\YV\SQdY ^ bUae\bUT Ri He\Uc ,.Q(,/Q^T ,OT(,/e^TUb dXU IUSeb\d\Uc ;hSXQ^WU 7 Sd V ,4./'Qc Q] U^TUT)&
- .-), 9UbdYYYSQdY ^ V 9XYUV ; hUSedYfU EWYSUb Q^T 9XYUV <Y^Q^SYQ\ EWYSUb `ebceQ^d d _,3 K)I)9) IUSdY ^ ,.0+' Qc QT `dUT `ebceQ^d d _ IUSdY ^ 4+1 _V dXU IQbRQ^Uc Eh\Ui 7 Sd _V -++-)&&
- ,+, JXU V__g Y^W VY^Q^SYQ\ Y^V_b] QdY_^ Vb_] dXU 9_] `Q^irc GeQbdUb\i HU`_bd_^ <_b] ,+(G V_b dXU aeQbdUb U^TUT : USU] RUb .,' -+- , V_b] QddUT Y^ ?^\Y^U N 8 HB5 \$Y% 9_^c_\YTQdUT IdQdU] U^dc_V E `UbQdY_^c V_b dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb .,' -+- , Q^T -+-+ \$e^QeTYdUT%6 \$YY% 9_^c_\YTQdUT IdQdU] U^dc_V 9_] `bUXU^cYfU ?^S_] U V_b dXU dXbUU Q^T cYh] _^dXc U^TUT : USU] RUb .,' -+- , Q^T -+-+ \$e^QeTYdUT%6 \$YYY% 9_^c_\YTQdUT IdQdU] U^dc_V 9QcX <_g c V_b dXU cYh] _^dXc U^TUT : USU] RUb .,' -+- , \$QeTYdUT%6 \$Yf% 9_^c_\YTQdUT IdQdU] U^dc_V 9QcX <_g c V_b dXU cYh] _^dXc U^TUT : USU] RUb .,' -+- , Q^T -+-+ \$e^QeTYdUT%6 Q^T \$f% D_dUc d_ dXU K^QeTYdUT 9_^c_\YTQdUT <\Y^Q^SYQ\ IdQdU] U^dc)&
- ,+/ JXU S_fUb `QWU Vb_] DU g c 9_b`_bQdY_^rc GeQbdUb\i HU`_bd _^ <_b] ,+(G V_b dXU aeQbdUb U^TUT : USU] RUb .,' -+- ,' V_b] QddUT Y^ ?^\Y^U N8HB \$Y^S\eTUT Qc ;hXYRYd ,+,%)&
- & <Y\UT XUbU g YdX)
- && <eb^YcXUT XUbU g YdX
- $k \qquad 9 \ \mathsf{UbdQY^{\ }} \ \mathsf{bdY_^{\ }} \ \mathsf{UhXYRYd} \ \mathsf{XQfU} \ \mathsf{RUU^{\ }} \] \ \mathsf{YddUT} \ \mathsf{`ebceQ^{\ }} \ \mathsf{d} \ \underline{\ } \ \mathsf{2} \ \mathsf{UU} \] \ 1 + , \\ \mathsf{RW\$}, + \mathsf{W} \ \underline{\ } \ \mathsf{V} \ \mathsf{HUWe} \ \mathsf{QdY_^{\ }} \ \mathsf{I} \ (\mathsf{A})$

H>< C6IJG:

 $FebceQ^d \ d_dXU \ bUaeYbU \] \ U^dc_V \ dXU \ IUSebYdYUc \ ; hSXQ^WU \ 7Sd_V \ , 4./' \ dXU \ bUWYcdbQ^d \ XQc \ Te\i \ SQecUT \ dXYc \ bU`_bd \ d_RU \ cYW^UT_^ Ydc \ RUXQVV \ Ri \ dXU \ e^TUbcYW^UT \ dXUbUe^d_Te\i \ QedX_bYjUT)$

D; MI 9EHFEH7 J?ED \$HUWYcdbQ^d%

8 i 5 *c* I ecQ^ FQ^eSSY_ I ecQ^ FQ^eSSY_ 9 XYUV <\footnote{Y}\Q\SYQ\ EVVYSUb

: QdU5 <URbeQb b Q d