I B=J 9F G=HMC: D=HHG6I F; < A UhYf]U`g`GV}YbWY' '9b[]bYYf]b['

I bXYf[fUXi UhY⁵5WJXYa]WDfc[fUa [']A Ubi U[']

8f"6f]Ub; `YYgcb` 7∖Ujfa Ub

 $8f^{H}AU_{1}g^{T}a]Yig^{H}AG^{T}bfc[fUa^{8}]fWhcf^{T}bfc$

I b]j YfglmcZD]HgVi f[\` A YWUb]WJ 9b[]bYYf]b[UbXA UhYf]Ug GVJVbW 8 YdUfha Ybh *' * 6YbYXi a < U`` ' +\$\$ C& UfUGHYYh D]HgVi f[\žD5 % &* % D\cbY. f(%&L* &(!- +, \$: U. f(%&L* &(!(, (*

K YV 5XXfYgg <u>\hdg ##k k k "Yb[]bYYf]b["d]h'YXi #a Ya g</u>

Bcj Ya VYf '\$' ž&\$&

]]

: cfk UfX

H]g A Uhtf]Ug GMMW UbX 9b[]bYff]b[I bXff fUX UhY 5WXYa]WDfc[fUa 'A Ubi U']g U gi d! $d'Ya Ybh'he'h Y]bZefa Uljeb'dfej]XYX]b'h Y Gk Ubgeb'GWee``cZ9b[]bYff]b[<math>\frac{1}{2}$ I bXff fUX UhY 7UUc[\ddot{z} k \]W]g'h Y cZ]WU gei fW cZ]bZefa Uljeb'Uvei h'h Y GWee` $\frac{1}{2}$ UWXYa]Wdfc[fUa g'UbX XY[fYY fYei]fYa Ybhg'' =h]g dfej]XYX ge'h Uh noi k]`` VY VYhMf']bZefa YX Uvei h noi f XYdUfha Ybh UbX Zef'noi f'Wbj Yb]YbW]b'a cb]hef]b['dfe[fYgg'hek UfXg Wa d`Yhjeb'cZ noi f' XY[fYY''H Y 'Uhtghij Yfg]eb'cZh]g a Ubi U'Wb'YY Zei bX cb'h Y A 9A G'8 YdUfha Ybh \underline{g} Chi XYbh' FYgei fWgk WdU Y'

]j

HUV`Y`cZ7cbhYbhg

%	ΙbΣ	(Yf[fUXiUhYDf	c[fUa '8YgW]dh]cb'	%
	%%		UYDfc[fta FthcbUY	""' %
	%&:		///b///bX9b[]b/Yf]b[`7i ff]W`i a '''''''''''''''''''''''''''''''''''	
		%&%	FYei]fYXAUNYaUjWgf) 7ci fgYgL"	····&
		%&"&:	FYei]fYX 6Ug]WGWYbWgff('7ci fgYgž%@UvL'""""""""""""""""""""""""""""""""""""	
		% & "''	FYei]fYX < i a Ub]h]YgUbXGcVJU GVJYbWgff 7ci fgYgL"""""""""""""""""""""""""""""""""""	
		%&"([.]	FYei]fYX7ca a i b]Wh]cbG_]``gfl%7ci fgYL'""""""""""""""""""""""""""""""""""""	
		%&!) ·	K f]h]b[FYei]fYa Ybh""""""""""""""""""""""""""""""""""""	''''`)
		% % "* ·	FYei]fYX6Ug]VØb[]bYYf]b[f) 7ci fgYgL ⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺⁺	""')
		% % #'+'	FYei]fYX7cfYA UMf]UgGVMbW/ 9b[]bYMf]b[fl% 7ci fgYgL"""""""""	
		% % ;	FYei]fYXA C9 HYWb]W 9 YMj Ygfl 7ci fgYgL	····-
		% & "- `	FYei]fYX'9b[]bYYf]b['9`YMj Yff%7ci fgYL''''''''''''''''''''''''''''''''''''	·%
	%" ·	5XjUbWXG	hbX]b['bXHfUbg24f '7fYX]h''''''''''''''''''''''''''''''''''''	'%
		%" "%	D7<9 ^{.7} fcgg/FY[]gffU ¹ jcb [.]	"%&
	%(`	I bXYf[fUXi	UYFYgci fWgK YVDU Y	"%
&	5 W	XYa]WDc`]Wni		%)
	&"%	;fUX]b[Gng	JYa ⁻	"%)
		&'%%	@YHMf; fUXYgUbX; fUXYDc]blg	
		&'%&	Ch Yf; fUXYg = bWa d`YhYžK]h XfUk bžF Yg[bYX""""""""""""""""""""""""""""""""""""	
	&"&	K]h\XfUkU		**
	&" .	7UW`Ul]cb`	cZh Y; fUXYDc]bh5j YfU Y''''''''''''''''''''''''''''''''''	%
		&"" "%	7ci fgYFYdYUg	"%+
	&"(`	5WXYa]Wk	cbcfg	""% +
		&"("%	HMfa < cbcf'@]gh'''''''''''''''''''''''''''''''''''	"%+
		&"("&	8 Ybbg < cbcf @]gh	"%+
	&") [.]	5WXYa]W8]gv]d`]bY''''''''''''''''''''''''''''''''''''	%
		&") "%	K Ub]b[%
		&") "&:		%
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	&"* `	FY]bgłUhła Y	dbh^{\prime	'%
	&"+`		FYei]fYaYblg	%
		&"+"%	GHth hrcZ@a]Hthcbg:""""""""""""""""""""""""""""""""""""	'88

' 8 Y[f YY C dh]cbg	&%
' '% 7ccdYfUlj Y9Xi WhjcbDfc[fUa ''"""""""""""""""""""""""""""""""""""	***************************************
' '& 9b[]bYYf]b[A]bcfg''''''''''''''''''''''''''''''''''''	**************************************
5flg UbXGWbWgA]bcfg	**************************************
' "(' 7Yfh]ZWh YDfc[flag [:] """"""""""""""""""""""""""""""""""""	
' ') 5flg'UbX'GV/MbWg!9b[]bYYf]b[`>c]bh8Y[fYYDfc[fUa`'""""""""""""""""""""""""""""""""""""	**************************************
' "* ' 9b[]bYYf]b[!GWcc`cZ9Xi Wh]cb'7Yfh]ZjWh]cb'Dfc[fUa''''''''''''''''''''''''''''''''''''	
' '+` I b]j Yfglmi< cbcfg [:] 7c``Y[Y''''''''''''''''''''''''''''''''''	
'', 9a Yf[]b[@YUXYfgDfc[fUa """"""""""""""""""""""""""""""""""""	*******
' '- ' =bhtfbUjcbU'9Xi Wjcb'')&` """"""
' '% FYMjj]b[; fUXiUY/7fYX]h'''''''''''''''''''''''''''''''''''')&` ''''''''
''% 7ca V]bYX@]VffU 5fhg/ '9b[]bYYf]b[' #&Dfc[fUa g''''''''''''''''''''''''''''''''''''	
5ddYbX]l '5 ' !'A G9 '7i ff]W `i a '7 \ YW `]gh	&+
5ddYbX]l 6 ! A G9 7ci fgYCZZ/f]b[gVmHYfa '	&
5ddYbX]l 7 ! A G9 GUa d`Y'GW YXi `Y'	' %
5ddYbX]l 8 ' !'7c!cd'GWYXi `Y': cfa '	
5ddYbX]l '9 ' ! DfYZYffYX'A G9 '7c!cd'GWYXi `Y'	')

7\Udh¥f %

I bXYf[fUXi UhYDfc[fUa '8 YgW]dh]cb

%% IbXYf[fUXiUhYDfc[fUa FUh]cbUY

A Uhf]Ug`]a]IUI]cbg cZhb`]a dYXY hWbc`c[]W`UbX gcVJU`dfc[fYgg"H\Y a Uhf]Ug`Yb[]bYf` Udd`]Yg gdYVJU`_bck`YX[YcZhYgłfi WifYžVY\Uj]cfžUbX'dfcdYfh]Yg cZa Uhf]Ug hc`gc`j Yh YgY a Uhf]Ug dfcVYa g"H\Y Vb[]bYff`a UhVY WbWfbYXk]h`XXjYcd]b[`UbX`]a dfcj]b[`dfcWggYg Zcf`dfcXi VJb[`a Uhf]Ugž XYjYcd]b[`bYk`a Uhf]Ug cf`]a dfcj]b[`Yl]gd]b[`a Uhf]Ugž UbX#cf` UW]Yj]b[`VYHhf`i]j`]nUI]cb`cZ a Uhf]Ug" BYk`a Uhf]Ug a i gh VY XYg[[bYX Zcf`U j U]YhmcZ Z bWlcbg`fh"["ž glfi WifUž UYgh YI]Wž YYWf]Wž cf` a U[bYI]WL UbX`cdYfU]b[`Ybj]fcba Yblg" A Uhf]Ug UfY XYUhk]h`]b`Zcfa g gc`a]bi hY h\UhNY kcf_`]g XcbY i bXYf`U a]WicgWdY UbX` gc``Uf[Yh\UhgdYVJU`\UbX]b[_WUbYgUfYfYei]fYX"

A Uhf]Ug CV/MW UbX 9b[]bYf]b[fA C9Ł]g U fYUlj YmbYk UbX j Ym]bhfX]gV/d]bUm ZYX"A C9]g Zcf gli XYblg k \c [Ybi]bYmk Ubhc VY]bj c j YXk]h i glb[Yb[]bYf]b[gV/MbW Uh h Y Wh]b[YX[Y cZ hcXLhg hWbc c[]W k cf X" A cXYfb A C9 W/Whg h Y Ígi ZÎ ci h cZ k \]W k YZVf]WhY ci f gcV/Mnži glb[WbWdlg cZYb[]bYYf]b[XYg][b Zi ca h Ya]WicgWd]WYj Y cZUca gia c YW YgžUbXYYWfcbghc h Ya UWicgWd]WgWYcZVf]X[Ygia UW]bYgia chcfgih fV]bY Yb[]bYgiUbXgi dYfgcb]WU]fWUZh

5 ° a Ưcf ʿ UłfUMijcb ʿ cZ hì]ġ ʿ a Ưcf ʿ]ġ ĥ Y VfYUMì ʿ cZ WFYf ʿ cddcfhi b]h]Yg ʿ U U`WY hc ʿ [fUXi UłYg VYWi gY cZ hì Y]a dUMi UbX]bZi YbW cZ a Uhf]Ug cb ʿ Ub ʿ Yj Yf![fYUhf ʿ bi a VYf ː cZ W]h]W ʿ a Ubi ZUMi f]b[ʿ UbX dfcWgg]b[ʿ hWbc ʿ c[]Yg UbX VYWi gY cZ hì Y]f ʿ W]h]W ʿ fc ʿ Y]b ʿ j]hU ʿ UfYLg ġ W ʿ Ug hfUbgdcfhLh]cbž YbYf[nž UbX Wa a i b]Wh]cbg'' A Uhf]Ug ġWbh]gg UbX Yb[]bYfg UfY \YUj]`m fYWi]hX Vm h`Y df]a Ufm a YhU`i f[]Wž UxfcgdUWž UbX `YYMifcb]Wg]bXi ghf]Yg'' A cfYcj Yfžcddcfhi b]h]Yg UfY[fck]b[]b h`YYa Yf[]b[`V]ca YX]W/#V]c Yb[]bYYf]b[`hWbc`c[]Yg'

=b h Yf WfYf UX dfcZýgjcbU Whj]hYgž k Y Y dYhi ci f [fUXi UYg hc fL: XYa cbgfUY g WYggZ ``Udd`]Whcb cZa UYf]Ug gYMbW UX Yb[]bYYf]b[`_bck `YX[YUbX'g_]``g Zcf]bXi g lfnž di V`]WgYhicf cf[Ub]nLhcbgž cf h Yf dfcZýgjcbž fM: di fgi Y``]ZY cb[``YUfb]b['h fci [\ 'UXj UbWX` dfcZýgjcbU XY[fYygž [fUXi UY gi X]Yg]b Yb[]bYYf]b[ž dfcZýgjcbU HU]b]b[ž cf Yb! []bYYf]b[` Wfh]ZWh]cbž UbX` fM/ XYa cbgfUY` dfcZýgjcbU UbX`]bhY`YMi U [fck h, 'Ug `YUXYfg]b h Y]f dfcZýgjcbU bX#cf Wa a i b]m

%'& A UhYf]U`g`GVJYbW`UbX`9b[]bYYf]b[`7i ff]W`i a

A]bcfgž7Yfh]Z]WhYgžUbX8iU`8Y[fYYg

K Y YbWi fU Y ci f`ghi XYbhg`hc`hU_Y Z ```UYj UbH [Y cZI b]j YfglmicZD]hgVi f[\`fYgci fWg UbX YXi Wh cbU`cddcfhi b]h Yg'' A UbmcZ ci f`ghi XYbhg`cVh Jb`A]bcfg`UbX#cf`7Yfh ZWhYg h\Uh UXX j Ui Y hc`h\Y]f`YXi Wh cb`UbX X[gh]b[i]g\`h\Ya`Ug`h\Yma cj Y Zcfk UX`]b`h\Y]f`WfYfg'' Gca Y cZci f`ghi XYbhg`Ugc`gYY_'U8i U`8Y[fYY`h\UhU [a Ybhg`h\Ya UMf]Ug`gWybW UbX`Yb[]bYff]b[` Yl dYf]YbWÌ gca Yha Yg`Ubch\Yf`Yb[]bYYf]b[`XX[fYYž gca Yha Yg`U XX[fYY`]b`5fhg'/ `GVJYbWg'' : cf`UXX[h]cbU`]bZcfa Uhcbž d`YUgY`fYZh'hc`h\Y A 9A G`8YdUfha Ybh<u>g`I bXyf[fUX]UY`8Y[fYY`</u> Cdhcbgk YdU[Y'

%% FYei]fYXAUh YaUh YaUh Wgfl) 7ci fgYgŁ

K YfYei]fYh\Uhghi XYbhga Ughf VUgWa Uh\Ya UhWi g_]`g]b UbUnhlW[Yca YhfnžWWi gž `]bYUf U[YVfUžUbXX]ZZfYbh]U Yei UhcbgUgdfYdUfUhcb Zcf a UghfmcZa Uhf]UggVWbWUbX Yb[]bYYf]b[Udd`]Whcbg"H\YfYei]fYXa Uh\Wi fgYgUFY.

- / A 5H \$&&\$ 5bUndy Y ca Yfm 7UW i g%f(WYX)hgL
- / A 5H< \$& \$ 5bUndy Yea Yifm' 7UW'i g&f(WYX)hgL
- / A 5Hk \$&(\$5bUnhjW) Yca Ylfnir 7UW i g' fl WYXjhgL
- *j* @]bYtf[·]5`[WfU

Ë A 5H< \$& \$=blfcXi WajcbhcAUf]Wag/ @bYUF5`[WfUfl WiYX]hgtzcf

Ë A 5H % \$ @bYLF 5`[YVfU%fl WfYX]bgtžcf

Ë A 5Hk %%) < cbcfg@bYUf 5`[WfUfl WfYX]hgL

i 8]ZXfYbhJU 9ei Uhcbg

Ë A 5Hk \$& \$8]ZZAFYbh]U 9ei Uh]cbgfl WAYX]hgłźcf

Ë A 5H< % CfX]bUfm8]Z2fYbh]U 9ei Uhcbg%fl WYX]hgL

Chi XYblg`]bhfYghX`]b`UA Uh\`A]bcf`g\ci`XWbglXYf`HJ_]b[`A 5H< %&+\$`]bghUXcZA 5H<`\$& \$` UbXY]h`Yf`A 5H<`% \$`cf`A 5H< %)`]bghUXcZA 5H<`\$& \$"7i ffYbhA 5H< Wi fgYXY! gW]dh]cbg`Wb`VYZci bXUh<u>DYcd`YCcZiA cV]`Y</u>

%"&" FYei]fYX'6Ug]WGV}YbWgfl('7ci fgYgž%@UVŁ

9b[]bYYf]b[`dfUMjWY]gZfYei YbhmXYgW]VYXUg*Udd`]VXzgVMbW**A UYYf]UggVMbWYUbXYb[]! bYYf]b[`fYei]fYg_bck`YX[YcZUbXUV]`]mhc`i gYVUg]Wd\ngWgUbXWYa]gfm"H\YfYei]fYX` VLgIVgVMbWgWi fgYgUfY.

/ HkcgYaYghYfgcZ]bhfcXiWtcfniWYa]ghm

Ë:]fghgYa YghYf.

17 < 9A \$%%; YbYfU 7\Ya]gfm%f(WYX]hgtžcf

17<9A \$(%; YbYfU 7\Ya]gfm%fl WXX]hgtžcf

17<9A \$+% < cbcfg; YbYfU 7\Ya]gfm%f(VfYX]hgtzcf

17<9A \$+*\$ < cbcfg; YbYfU 7\Ya]gfmZcf 9b[]bYYfg%fl VfYX]bgHzcf

/7<9A \$-*\$; YbYfU 7\Ya]gfmizcf 9b[]bYYfg%fl WYX]hgL

Ë GYWAbX gYa YghYf.

17<9A \$%&\$; YbYfU 7\Ya]gfm&f(WYX]hgtžcf

17<9A \$(&\$; YbYfU 7\Ya]gfm&fl WYX]lgtžcf

17<9A \$+&\$ < cbcfg; YbYfU 7\Ya]gfm&f(WYX]hgłźcf

17<9A \$++\$ < cbcfg; YbYfU 7\Ya]gfmZcf 9b[]bYYfg&fl WYX]bgtzcf

17<9A \$-+\$; YbYfU 7\Ya]gfmi2cf 9b[]bYYfg&fl WYX]hgL

B c.hY. h\Y7< 9A `\$(%\$#7< 9A `\$(&\$ gYei YbWUgc fYei]fYg 7< 9A `\$('\$; YbYfU` 7\Ya]gfm%@UvcfUcfmff%WYX]hg!"

/ HkcgYaYghYfgcZW/W/igVLgYXd\ngWg

Ë:]fghigYa YghYf.

 $\label{eq:main_states} $$ID< MGS(+) < cbcfgD\ng]VgZcfGVJVbVV/ 9b[]bYYf]b[%f(VfYX]hgtZcf ID< MGS(+) < cbcfgD\ng]Vg%f(VfYX]hgt_$

Ë GYWAbX'gYa YghYf.

 $\label{eq:mg} $$ID< MG$%) $$GUgWD\mgWgZcfGVWbWY $$9b[]bYYf]b[&f(WYX]hgtzcf $$ID< MG$(+* < cbcfgD\mgWg&f(WYX]hgt.$$$

7i ffYbhD< MGUbX7< 9A Wi fgYXYgW]dh]cbgWbVYZci bXUh<u>DYcd`YGcZiA cV]`Y</u>

%%" FYei]fYX < i a Ub]h]YgUbX GcV/U GV/YbWgff* 7ci fgYgŁ

H\YGk Ubgcb GWcc`cZ9b[]bYYf]b[fGGc9£fYei]fYgU`i bXYf[fUXi UYghc Wa d`YhYUh`YUgh g]] \i a Ub]h]YgUbXgcVJU gVJVbWfk #GGLYYVJj YWi fgYgh\UhUX\YfYhc h\Y<u>GGc9; i]XY]bYg</u> <u>UbXFYei]fYa Ybhg]</u>b cfXYf hc gU]gZnGGc9 UbX569HUWIYX]HJ]cb fYei]fYa YbhgZcf VfYUXh UbXXYdh\"D`YUgYa U_Ygi fYh\Uhnci UX\YfYhc h\YfYei]fYa YbhgZcf VfYUXh\ UbXXYdh\"

K \]`Y cb`mUddfcj YX \i a Ub]ljYg UbX gcVJU gVJYbWg Wi fgYg Wb VY i gYX hc gLljgZmh Y < #GG fYei]fYa Ybhgž h Y Uddfcj YX `]gh]g bchglLljWBYk Wi fgYg UYY UXXYX ZYei Ybhn"Gh ! XYbhg a UmdYl]ljcb h Y GYb]cf 5ggcVJUY 8 YUb Zcf 5WXYa]W5ZLJfg hc \Uj Y UWi fgY UXXYX hc h Y `]gh cZUddf cj YX Wi fgYg Vmgi Va]h]b['Ub 5 ddf cj U' F Yei Ygh Zcf '< i a Ub]h]Yg#Gc V/U' GV/Yb W' 9 `YVh]j Y Zcfa ž Uj U)`UV Y cb h Y A 9A G 8 YdUfha Ybhg Ch XYbh F Ygci f Wg k</u> YVdU Y'' H Y Zcfa 'a i gh VY h fbYX]b hc h Y GYb]cf 5ggc V/UY 8 YUb 'Zcf 5 WXYa]W5ZU]fg CZJW fl(+ 6YbYXi a '< U'E Zcf 'Uddf cj U''' Ch XYbhg Wb WohlMi h Y I bXYf[fUXi Uh' Df c[fUa 'CZJW fl(+ 6YbYXi a '< U'E Zcf 'Uddf cj U''' Ch XYbhg Wb 'WohlMi h Y I bXYf[fUXi Uh' Df c[fUa 'CZJW fl(+ 'GYb]cf 'gY']Zh Y Wi fgY'' k Ug Uddf cj YX''=h]g \Y'dZ ``hc ']bWi XY U Wdm cZ U Wi fgY XYgW]dh]cb 'Zcf 'h Y Wi fgY'' 7 ci fgYg h Uh UY XY'a YX gi ZJV/Mbhm fY'j Ubh Ub 'UWXYa]W `mUddf cdf]Uh' [YbYfU`mUfY Uddf cj YX'' 6f cUX gi fj YmWi fgYg flmd]W`mVY ck 'h Y '%\$ ``Yj Y h UhfY'[YbYfU`mHi [\h]b ``U[Y`YMi fYgWh]cbgLtfYi gi U`mbchUddf cj YX''

BchYgUbXFYghf]WalcbgcbGYYWalb[7cifgYg

- / HfUbg2df gli Xyblg a UniVYfYei]fYX'hc HJ_Y9B; 7A D'\$&\$\$ GYa]bUf]b 7ca dcg[h]cb"H\]g XcYgbchWi bhUgcbYcZh\Yg] fYei]fYXYYWij YWi fgYg"
- j Bc'a cfY h\Ub'lk c'cZ h\Y gll fYei]fYX YYMij Y Wi fgYg Wb VY gUhgZYX j]U UXj UbWX gHLbX]b[\WYX]hZfca 5D'H Ua gWfYg'
- j 7ci fgYg h\UhUY Wicgg\]gHX`k]h\ch\Yf XYdUfha Ybhg a UmVY HJ_Yb i bXYf Y]h\Yf Wi fgY bi a VYf ffY"["ž 5BH< '% &(']g Yei]j UYbh hc < 55 '%) \$L UbX a UmVY i gYX hc gUjgZmh\Y XYdh\ fYei]fYa Ybh]b Y]h\Yf XYdUfha Ybh"
- j Ghi XYbhg UfY glfcb[`mYbWri fU YX hc`i gY`Ub[i U Y Wri fgYg hc`dUfh]U`mgUlgZmh Y \i ! a Ub]h]Yg UbX gc VJU`gVJYbWrY YWdj YfYei]fYa Ybhg"H\fYY ci hcZZj Yžcf`gl] `ci hcZhYb ZfgH` mYUF``Ub[i U Y Wri fgY VXYX]hg UfY UWYdHUVY hck UfX`Z `Z]``]b[`h\Y`\i a Ub]h]Yg UbX gc VJU` gVJYbWrY YWdj YfYei]fYa Ybhg"< ck Yj Yfžh YZc``ck]b[`fYghf]Wdcbg Udd`m</p>
 - $\ddot{E} H (Y) b[i U) fgLa i ghVY ch Yf h b 9b[]g "$
 - Ë H\Y`Ub[i U, YfgLa i ghVYch\Yf h\Ub h\Yghi XYbhga ch\Yf hcb[i Y
 - Ë H\YWri fgYfgLa i ghVYUVcbUZJXY`Ub[i U YWri fgY"
- / 8]Yhf]W GWcc``cZ5fhg/ GVJYbWg fBG5GL Wi fgYg Wicggl`]ghX`k]h`7c``Y[YcZ; YbYfU Gh X]Yg f7; GL Wi fgYg h Un UY XYg][bUhX Ug gYZdUWX fgYZz cb`]bY fk k k łz cf `\nYf]X` cb`]bYfh nYf]XLcf bchUWYdHU/YZcfZ 'Z]``]b[h Y< #GGfYei]fYa Ybhg"</p>

7i ffYbhWri fgYXYgWJdl]cbgZcf < #CGWri fgYgWbVYZci bXUh<u>DYcd`YCcZnA cV]`Y</u>

%"&"(FYei]fYX"7ca a i b]Wh]cb'G_]``g'f%7ci fgYL

- *j* 7CAAF7'\$) \$\$'5f[i a Ybhfl 'WYX]hgL
- / 7CAAF7'S) & DiV]WGdYU_]b['fl'WYX]hgL

- / 7CAAF7'S) (\$'8]gWgg]cbfl WYX]hgL
- / 9B; 7A D \$(\$\$ K f]hhb DfcZ/gg]cbU 7ca a i b]Whcb fl WYX]hgL
- / 9B; 7A D'\$(\$%K f]hhb DfcZygg]cbU 7ca a i b]Wh]cb. Hcd]W]b 8 jj Yfg]mfl WYX]hgL
- / 9B; 7A D`\$(%29b[]bYYf]b[7ca a i b]Whcb]b UDfcZygg]cbU 7cbhM hfl WYX]hgL
- / 9B; 7A D \$* \$\$ =blfcXi Wijcb hc HYWb]W/K f]hjb[fl WYX]hgL
- / 9B; F %\$%\$ 7ca a i b]Wh]cb G_]``gZcf 9b[]bYYfgfl WYX]hgL

%"&") K f]h]b[F Yei]f Ya Ybh

5[`] Ck Ubgeb[·] GWee[·] cZ 9b[]bYYf]b[[·]głi XYbłg a i głi Wa d`YłY Ui `YUgłi ebY kf]l]b[[·]]błłbgji Y Wi fgYffYZffYX le Zica [·]bek [·]eb[·]UgʻUK !Wi fgYfzUgʻWfh]ZYX Vmh Y8]Yff]W[·]GWee[·] cZ5flg[·]UbX GVJłbWg^{''} K \Yb[·]j]Yk]b[⁻h Y 7[·]Ugg 8YfU]^{··}Zef[·] Wi fgYg eb[·]]bYž K !Wi fgYg[·]UY X]gh]b[i]g\YX Vm \Uj]b[⁻ K f]h]b[⁻ F Yei]fYa Ybh 7ci fgY^{··}]ghX[·] Ug[·]ebY[·]eZ h\Y]f[·] 7[·]Ugg[·]5llf]Vi h/g^{''} Cb[·]m Wi fgYgh\Uh\UjYh]g7[·]Ugg[·]5llf]Vi hYWb[·]VYi gYXheˈgU]gZnh\Ykf]h]b[fYei]fYa Ybh[']

- j Chi XYblg g\ci `X fYZf `hc `DYcd`YGcZh f]b `h Y 7`Ugg GYUf W `gWYYbž WccgY K f]h]b[`Cdh]cb `Zfca `h Y F Yei]fYa Ybh 8 Yg][bUh]cb `ZfYXL YUW hYfa `hc `XYhYfa]bY k \Yh Yf` U Wi fgY]g VY]b[`cZZfYX Ug U K !XYg][bUhX Wi fgY f]"Yž Wi fgYg k]h `h Y K f]h]b[`F Yei]fYa Ybh 7ci fgY Uhf]Vi hYL" BchY h Uhh YfY UfY Wi fgYg h Uha Um\Uj Y Uk f]h]b[`cdh]cbžVi hbchZcf U`cZh Y]f gWi]cbg"
- j H\Y k f]h]b['fYei]fYa Ybh k]`` bcfa U`mVY Z 'Z]`YX VmYbgi f]b['h\Uh Y]h\Yf cbY cZh\Y g]l 'fYei]fYX < i a Ub]h]Yg UbX GcVJU 'GVJVbWg 9`YMdj Yg cf 'h\Y 7ca a i b]Wh]cbg G_]``g 9`YMdj Y]g U K !Wi fgY" =h k]`` bch hnd]W/`mfYei]fY U ghi Xybh hc 'HJ_Y Ub 'UXX]h]cbU ' Wi fgY"
- j 9B; 7A D \$&\$\$ GYa]bUf]b 7ca dcg]hcb]g bch U K !Wi fgY UbX XcYg bch gUhgZnh Y k f]h]b[fYei]fYa Ybh

%"&"* FYei]fYX6Ug]W9b[]bYYf]b[f) 7ci fgYgŁ

H\YfYei]fYXVUgWb[]bYYf]b[Wi fgYg'UY.

j∶ fYg\a Ub 9b[]bYYf]b[žZ]fghgYa YgNf.

Ë 9B; F \$\$%-blfcXi Wijcbhc 9b[]bYYf]b[5bUngggfl WiYX]hgtžcf

Ë 9B; F \$\$%) = blfcXi Wajcb hc 9b[]bYYf]b[5bUng]gfl WYX]hgtzcf

Ë 9B; F \$+% < cbcfg9b[]bYYf]b[5bUngggUbX7ca di hb[fl WYX]hgL

B c hY. `HfUbg2ff`gli XYblg`Wb`gl Vgh]li hY`Ubm`Yb[]bYYf]b[`Wi fgY`Zcf`h\Y`ZfghigYa Yghff` : fYg\a Ub'9b[]bYYf]b[`fYei]fYa Ybh'

j ∶ fYg\a Ub 9b[]bYYf]b[žgYWbXgYa YghYf.

- Ë 9B; F \$\$% &= blfcXi Wijcbhc 9b[]bYYf]b[7ca di hjb[fl WiYX]hgtžcf
- Ë 9B; F \$\$% = blfcXi Wijcb hc 9b[]bYYf]b[7ca di hjb[fl WYX]hgłźcf
- Ë '9B; F '\$+%& 5Xj UbWX '9b[]bYYf]b['5dd`]WJdcbg Zcf': fYg\a Yb fk cbcfgLfl 'WYX]hgtžcf
- Ë '9B; F '\$+% '5fh cZ < UbXg Cb 'GnghYa '8Yg][b 'UbX'9b[]bYYf]b['f5fh cZ A U_]b[E fl 'WYX]hgL

B c hY. 'Ghi XYbhg' k \ c' HU_Y 9B; F' \$\$% 'a i ghi Ugc' HU_Y 9B; 7A D' \$&\$\$' GYa]bUf']b'' 7ca dcg]h]cb'fl 'WYX]hgt"

- j 9B; F`\$\$&%DfcVUV]`]lmUbXCHUhgh]V&Zcf9b[]bYYfgfl VXX[hgL
 5b`]bhfcXi Vacfm WrifgY]b`ghUhgh]V&" Hcd]Vy WrjYfYX]bWiXY. XUHU UbUnglgz dfcVUV]`]lmž fUbXca jUF]UVYgz gYYVMXX XlgWNHY UbX Wrbh]bicig dfcVUV]`]lm
 Xlghf]Vih]cbgz cbY glad`Y UbX hkc glad`Y Ygh]aUh]cbz \ndich\Yg]g hYgh]b[ž
 YldYf]aYbhg k]h. hkc ZUMacfg UbX]bhfcXi Wa]cb hc fY[fYgg]cb UbUngg]g" DfYfYei]g]hYg
 A 5Hk S& S"
- j' 9B; F`\$%) GHLIJVg/ A YWUbJVgcZA UMfJUg%fl VXXJlpf.
 :]fghcZUłk c Wi fgY gYei YbW Wj YfJb['gHLIJVg UbX a YWUbJVg cZa UMfJUg"HcdJVg Wj ! YfYX]bW XX: WbWffYbhZcfW gngMa gž Yei]`]VfJi a žU JU``cUXJb[žgfYggž gffUbžXYZcf! a UIjcbža ca Ybhgž Yei]j UYbhgngMa gž WbHcJXgž WbHfg cZa Ugg UbX XJgff]Vi hXX `cUXgž ZYY!VcXmXJU fUa gž Yei]`]VfJi a `cZfJ[]X UbX XYZcfa UVY VcXJYgž d`UbY Hi ggYgž ZUa Yg UbX a UWJbYgž Yei]`]VfJi a `]b`' 8ž hcfglcbž UbX ZfJVIJcb" DfYfYei]ghYg A 5Hk `\$& Sž D< MG`\$%("

j 9B; F \$%() GhtljVg/ A WWbJVgcZA Uhff]Ug &ff WYXJhgL GYWbX cZU hk c Wi fgY gYei YbW Wj Yf]b[ghtljVg UbX a WWUbJVg cZ a Uhff]Ug" Hcd]Vg]bW XY. ZYI i fY/ gYWbX a ca Ybh cZUYUgz g\YUf ZcfW UbX VYbXJb[a ca Ybh X]U[fUa gz Wa dcg]hY VYUa gz g\YUf]b[gfYggYgz VYUa XYZYMjcbgz YbYf[ma Yh cXgz Wa V]bYX gfUJW `cUX]b[zUbX'Vi W]b[cZWi a bg"DfYfYei]g]hY. 9B; F \$%) "

%%%"+`FYei]fYX?cfYAUhYf]U`g`GVJYbWY/`9b[]bYYf]b[`ff%`7cifgYgŁ

H\YfYei]fYXWfYa WWb]W Yb[]bYYf]b[Wi fgYgUfY.

/ A 9A G\$\$\$& =blfcXi Wijcb lc A Uhf]UgGW/WbW1bX9b[]bYf]b[fl WXX]hgL H\]g]g Ub]blfcXi Wicfm WUgg Zcf ghi Xhbhg a Ucf]b[]b a Uhf]Ug gW/WbW1 UbX Yb[]bYf]b[" =h VI]]bg Vm ZcWg]b[cb Z bXLa YbHUg cZ ghfi Wi fY]bWi X]b[VcbX]b[ž WingHU ghfi Wi fYg UbX XYZWi]b WingHUg UbX a]Wicghfi Wi fY" =h h Yb UXXFYggYg h Y fYU]cbg\]d VYhk YYb ghfi Wi fY UbX dfcdYfh]Ygž]bWi X]b[a YWUb]WZ h Yfa Už YYWf]WZ a U bYh]Wz UbX cdh]WU dfcdYfh]Yg" =h WzbWi XYg Vm]blfcXi VJb[h Yfa cXnbUa]W UbX _]bYh]W df]bV/d Yg cZ a Uhf]Ug YgdYVJU m h cgY dYfh]bYbh hc a Uhf]UgdfcWgg]b["DfYfYei]g]hYg A 5Hc \$& \$ZD< MG\$%("</p>

- j A 9A G\$\$\$&(=bhfcXi WajcbhcA YWUb]W/9b[]bYYf]b[8Yg][bfl WYX]hgL
 : i bXLa YbHJgcZh YXYg][bdfcWggžVUg]WhWb]ei YgcZ[fUd\]WWa a i b]WhjcbžUbX
 Ub]bhfcXi Wajcbhch Ya cghWa a cba YWUb]W/Wa dcbYbhgUbXa Ubi ZUMi f]b[dfc!
 WggYg'DfYfYei]g]hY 9B; F \$\$\$%6
- / A 9A G \$ \$ (% A UM f] Ug Df c Wgg b[fl WYX hg L

H\]g WLgg Wj Yfg h\Y Zc``ck]b[hcd]Wg Gi gHJbUVY dfcXi Wijcb UbX fYWrWjb[cZ a UhYf]Ug" FYZb]b[cZ a YHJgž df]a Uf]`m Zcf]fcb UbX Ui a]bi a " : i bXLa YbHJg cZ gc`]XJZWIjcb!VLgYX UbX XYZcfa Ujcb!VLgYX g\Ud]b[dfcWggYg" Dck XYf dfcWgg]b[cZ a YHJg UbX WFUa]Wg" DfcdYfhm Yb\UbVjb[cdYfUjcbg UbX a UhYf]U#dfcWgg gYYWijcb" 9b[]bYYf]b[UbX ZVf]WIjcb cZ Wa dcg]hY a UhYf]Ug" 7cfYei]g]hY. A 9A G \$\$&"

- / A 9A G`\$\$(, `H\Yfa cXnbUa]\&cZA UhYf]Ugfl \&YX]hgL H\]g \&i fgY hYUWYg h\Y \&gYbh]Ug cZh Yfa cXnbUa]\&cZa UhYf]Ugž k\]W \&bWfbg h\Y VUgWWbWdhg UbX df]b\/d`Yg cZ h\Yfa cXnbUa]\&z UbX h\Y Udd`]\&hcb cZ h\Yfa cXnh bUa]\&df]b\/d`Yg hc h\Y UbUngjg cZU a i`hlh XY cZd\Ybca YbU fYUhXX hc h\Y V\U]cf` cZa UhYf]Ug" H\Y \&i fgY \&j Yfg hcd]\&cb h\Y`Uk g cZh\Yfa cXnbUa]\&z fYUhcb 'VH Yb` k cf_ž\YUhUbX YbYf[nž YbIfcdnž ZYY YbYf[nž d\UgY Yei]`]Vf]i a `]b`cbY!\&a dcbYbhgng hYa gž WYa]\W` fYU\\$Vg Dyf fyg hc]bj c`j]b[`[UgYgž UbX WYa]\W` fYU\\$Jcb 'Vh yb` ubX[UgYg DfYfYei]g]hYg D< MG`\$%(z7< 9A `\$-* \$"'7c!fYei]g]hY. A 5H< `\$& \$"</p>
- / A 9A G%\$% 9I dYf Ja YbHU A Yh\cXg Jb A C9 fl WYX JbeL

H \g`UvcfUtcfmk]```[]jYhYgi XYbhdfUMJW'YdY]YbW cZhYYdYfa YbU'a YhcXg i gYX]b'a cXYfb'a UMf]Ug gYYbW UbX Yb[]bYYf]b["'H YZfgi gYh cZYdYf]a Yblg k]``]bHcXiW hY Wa a cb'a Yh cXg Zcf'UbUmn]b['a UMf]U'gfi WifY]bWiX]b[. 'cdh]W` a]WcgWdnž L!fUnX]ZfUMjcbž UbX gWbb]b['YYMfcb'a]WcgWdmfC9A L''H Y gYWbX dUfhcZhYWifgYk]``WbWblfUYcb'a Yh cXg i gYXhc'a YUg fY'a UMf]U'dfcdYfhYg g W' Ug hY hYbg'Y hYgiž \UfXbYgg hYgiž]a dUMi hYgi]b['Ug kY``Ug YYMf]W'UbX a UbYi]W dfcdYfhma YUg fY'a Ybha Yh cXg 'DfYfYei]g]hY.9B; F \$\$\$&

/ A 9A G%\$%%Clfi Wa fYg/ DfcdYfh]Yg@UVcfUcfnfl WfYX]hgL

/ A 9A G % & A YWUb]W 8 Yg[[b % fl WYX]hgL

GhfYgg UbXXYZYMicb UbUngig/gi fjYmcZa YWUb]W/XYg[[b Wi]hhf]U/gY Whicb UbXUdd`]! Whicb cZkcf_]b[`ghfYggYg Zcf Xi WijY UbX Vf]hhY a Uhf]Ug/gHJWZ Zhi][i Yž UbX]a dUMi `cUX]b[UbXWa V]bUi]cb cZghfYggYg"DfYfYei]ghY.9B; F \$%() "

- / A 9A G%5' \$ A UMF]U GYYMAJcb]b A YWUb]W 8 Yg[[bfl WYX]hgL
- A Yh cXc`c[mŻcf`a Uhf]UgʻgYYMjcb`]b`a YWUb]W`XYg[[b`dfcWggYg"=bWi XYgʻf]EXYg][b` dfcWgg UbX WobgXYfU]cbž f]]E W]hYf]UŻcf`a Uhf]UgʻUbX h`Yff`g\UdY`gYYMjcbž UbX`f]]]E XYg][b`WgY`głi Xn"A YWUb]W`Wa dcbYbhg`\UjY`a Ugg⁄ h`YmWffm`cUXg⁄ h`YmWobXi Wi \YUh`UbX`YYMf]V]ma`h`YmUY`YI dcgYX`hc`k YU`UbX`hc`Wffcg]jY`Ybj]fcba Ybhg⁄ h`YmUY a UXY`cZ`cbY`cf`a cfY`a Uhf]Ug⁄ h`Ym\UjY`g\UdY⁄ UbX`h`Yma i gh`VY`a Ubi ZUMi fYX'' H\]g`Wi fgY`dfcj]XYg_bck`YX[Ycb`\ck`h`YgY`UMij]h]Yg`UfY`fYUhX''DfYfYei]g]hYg`9B; F` \$\$&&žA 9A G%& "
- j A 9A G% ('GYb]cf 8 Yg[[b Dfc^YWiff] WYX]lgL 5 a Ucf dfc^YWi]bj c`j]b[``]hYfUi fYgYUFWžd`Ubb]b[žXYg][bžZWf]Wi]cbžYl dYf]a Yb!hU]cbž UbUng]gžUbXhYWb]W fYdcfhk f]hJb[]gdYfZcfa YXVnUga U``hYLa cZgh XYbhgi bXYf h Y [i]XLbWcZUZW mX]fYWicf UbXW a]bUHyg]b Ub cfU dfYgYbhU]cb UhUhYWb]W gna dcgh a "DfYfYei]g]hY. ugpkqt "ucpf kpi"
- j A 9A G%\$) &< Yuh/ A Ugg/HfUbgZfffl WYX]hgL CbY UbX lk c!X]a YbglcbU 'gh/UXmUbX i bgh/UXmlg/UhY WbXi Wijcbž Ya d]f]W UbX dfUMj! W fYUljcbg Zcf ZcfWX UbX bUi fU Wbj YMijcb" Df]bV/d Y cZ fUX]Uljcb i glb['lfUX]Uljcb bYlk cf_Î a Yh\cX" < Yuh Yl WUb[Yfg UbX gdYVJU hcd]Vg" DfYfYei]g]hY. A 9A G \$\$(, `cf` A 9A G \$\$)%
- / A 9A G%\$) ' 'Clfi Wai fY'cZ7fngłUg/ '8]ZfUWajcb fl 'WYX]hgŁ 7fngłU`c[fUd\mcZ a UMf]Ug/ 6fUj Ug' `Uh]Wgž WangłU` gngłMa gž UbX WangłU` glfi Wai fYg'' 8]ZfUWajcb a Yh\cXg/L!fUnž YYWafcbž UbX bYi hfcb 'gWthMf]b[/'Urca]WgWthMf]b[' ZUWaff/ głfi Wai fY' ZUWaff/ dck XYf 'hWb]ei Yg/ @U Y a Yh\cX/ fYVJdfcW```Uh]W/ YYWafcb X]ZfUW/ hjcb/Ua cfd\ci g` a UMf]Ug/h\Yfa cXmbUa]Wg cZ WangłUg UbX WangłU` XYZWaf/ dc`na cf! d\]ga /cfXYf!X]gcfXYf'd\Ybca YbU'DfYfYei]g]hY. 9B; F`\$\$&&"
- j A 9A G%), '9 YMrca U bYHWDfcdYfHJYgcZA UhYfJUgfl WYXJhgL FYj JYk cZ VLgJWdf]bVJd Ygl ei Ubli a 'h Ycfmž VLbX UbX ncbY h Ycfm' HrUbgdcfhž YYW HfJWJž UbX h Yfa U dfcdYfHJYg/ gYa JWbXi Wrcfg UbX gYa JWbXi Wrcf Xyj JWrg/ a U bYHJW a UhYfJUgl \UfXUbXgcZr/XJYYMrJWLbXcdHJW dfcdYfHJYg' DfYfYei]g]hY. 9B; F \$\$&&;
- j A 9A G%) D\UgY9ei]`]Vf]U]b A i `I]!7ca dcbYbhA UMf]Ugfl WYX]hgL H\Yfa cXmbUa]WgcZgc`i I]cbgk]h\Udd`]Wh]cbghc a UMf]UggnghAa g\\Yhfc[YbYci g d\UgYYei]`]Vf]U/fYUI]cbgVIk YYb ZYYYbYf[mLbXd\UgYX]U fUa g/YYMfcWYa]gfm/ fUM/dfcWggYg/h\Yfa cXmbUa]WgcZgi fZWg"DfYfYei]g]h/g 9B; F \$\$&&&ZA 9A G\$\$(, "
- j' A 9A G%\$*' 'D\\\\U03c3YHFUbg&cfa U\\]cbg/' A]\\\U03c3ffi \\U03c3ffi \\

- j A 9A G%\$+\$`A YWUb]WU`6Y\Uj]cf`cZA UMf]Ugʻfl WYX]hgŁ H\Ycfm`cZ YUgʻlYhnž gʻfYggž gʻfU]bž Wobgʻlhi hj Y Yei Ulcbgž]gchfcd]WUbX`Ub]gchfcd]W YUgʻlYhnž k Uj Y dfcdU[Ulcb`]b`Vf]hhY gc`]Xgž hJa Y XYdYbXYbhXYZcfa Ulcbžj]gWYUgʻlW]hnž j]VfUlcbgž XLa d]b[ž UbYUgʻlYhnž WYYdž XYg][b`cZ WYYd`fYg]gʻLbh a]Wicgffi Wa fYgž XYZcfa Ulcb`cZdc`ma Yfgžd\ng]WgʻcZZUMa fYžZUMa fYa YWUb]ga gžVf]hhYZUMa fYžXi W hj`Y ZUMa fYž XYg][b`cZ ZUMa fY!fYg]gʻLbh a]Wicgffi Wa fYg'' DfYfYei]g]hgʻ9B; F`\$\$&&ž 9B; F`\$%)"
- j A 9A G%+- `GYb]cf`A UYf]Ug`F YgYUW Dfc^YWiff WYX]lgL 5 `a Ucf`dfc^YWi]bj c`j]b[``]hffUi fY`gYUW`z`d`Ubb]b[`z`Yl dYf]a YbHLHcbžUbUng]gžUb`cfU` dfYgYbHLHcbžUbX`U ZbU` hWb]W` fYdcfh" H\Y dfc^YWi]g`Y]h\Yf`gdcbgcfYX`Vm h\Y XYdUfha Ybh cf`U`cW`Wa dUbmUbX`]g`WbXi WiXX`VmUb`]bX[j]Xi U`cf`U ga U``hYUa`cZ ghi XYblgk]h\UZW\`mLYj]gYf"DfYfYei]g]hY. ugpkqt'ucpf kpi "
- A 9A G%,) 8 YdUfha YbHU GYa]bUf ffs WYX]hgL.
 GYa]bUfg UfY XYg][bYX hc UWi U]bhh Y gh XYbhk]h UgdYMg cZYb[]bYYf]b[bchbcfa U`m YbWi bhffYX]b WUggYg UbX]bWi XY U k]XY fUb[Y cZ hcd]Wg gi W Ug h Y g][b]ZWbW cZ Yb[]bYYf]b[UgUdfcZýgg]cb UbXh YfYU]cb cZYb[]bYYf]b[hc WffYbhgcVJU dfcVYa g'
- A 9A G%, * A G9 Dfc[fUa GYa]bUf ffs WYX]bgL
 GYa]bUfg UfY XYg][bYX hc UWi U]bhh Y gi XYbhk]h UgdYMg cZYb[]bYYf]b[bchbcfa U`m
 YbWi bhfYX]b WUggYg UbX]bWi XY U k]XY fUb[Y cZ hcd]Wg gi W Ug h Y g][b]ZWbW cZ
 Yb[]bYYf]b[UgUdfcZýgg]cb UbX h YfYU]cb cZYb[]bYYf]b[hc WffYbhgcVJU dfcVYa g'

%"&", FYei]fYXAG9HYWb]WD9`YWjjYgfl 7ci fgYgŁ

Chi XYbhg UfY fYei]fYX hc 'gUlgaUMcf]`mWa d`YhY h\fYY cZh Y Zc``ck]b['A UhYf]Ug CMMbW UbX 9b[]bYYf]b['HYWb]W' 9`YWij Y Wi fgYg'' 7i ffYbh Wi fgY XYgWi]dh]cbg Zcf 'h YgY Wi fgYg Wb 'Y' Zci bX'U<u>hDYcd`YCcZhA cV]`Y'</u> 'Cca Ygi [[YghX`gYei YbWg]bWi XY.

- 6i `_ 9b[]bYYf]b[A UhYf]Ugfl cZh YZc``ck]b[Wi fgYgL A 9A G%(, '5bUng]gUbX7\UUMMf]nUjcb Uih YB Ubc!gWY A 9A G%, \$ Dck XYf DfcWgg]b[cZA UhYf]Ug A 9A G%, + Gi glU]bU/YA UhYf]UgDfcXi Wijcb A 9A G%%('5Xj UbWXD\ng]W/A YlU`i f[mcZBcb!: Yffci g5``cng A 9A G%%) GhY'a U_]b[UbXGi glU]bU/]`]lm A 9A G%% \$ =blfcXi Wijcb hc 5XX]hj YA Ubi ZUMi f]b[cZA UhYf]Ug A 9A G%% ' 7YfUa]WA UhYf]Ug A 9A G%% ('7YfUa]WA UhYf]Ug
- j BUbca Uhif]U'g UbXBUbca Ubi ZUMi f]b[fl cZh\YZc``ck]b[Wei fgYgŁ A 9A G%(, 5bUng]g UbX7\UfUMMf]nLljcb Uhih YBUbc!gWY A 9A G%) + A]Wic#BUbc A Ubi ZUMi f]b[A 9A G%+(BUbca Uhif]UgUbX6]ca c`WW Uf 5ggYa Vm

A 9A G%, \$ Dck XXf DfcWgglb[cZA UMf]Ug A 9A G%%A UMf]UgZcf 9bYf[m; YbYfUjcb UbXChcfU[Y A 9A G%%' '7YfUa]VA UMf]Ug A G9 & %Hf]Vc`c[mUX\Yg]cbžZf]Vbjcbž`i Vf]WJjcbžk YUf 9B; F \$&(\$ B UbchWbc`c[mLbXBUbcYb[]bYYf]b[9B; F %\$** =blfcXi Vbjcb hc Cc`Uf 7Y`gUbXBUbchWbc`c[m

- j Dc`ma Yfgfl`cZh\YZc``ck]b[Wi fgYgŁ
 7< 9A \$' \$ Cf[Ub]W7\Ya]gfm%
 7< 9A \$' \$ Cf[Ub]W7\Ya]gfm&
 7< 9A \$ \$ Cf[Ub]W7\Ya]gfm&
 7< 9A \$ \$\$ Cmbh\Ygg/ 7\UfUMMf]nLh]cbcZDc`ma Yfg
 7< 9%) (Df]bV/d`YgcZDc`ma Yf 9b[]bYyf]b[
- j 5Xj UbWXA Ubi ZJMi f]b[fl 'cZh YZc ``ck]b[Wi fgYgŁ A 9A G%) + A]Mc#BUbc A Ubi ZJMi f]b[A 9A G%, \$ Dck XYf DfcWgg]b[cZA UhYf]Ug A 9A G%, + Gi gHJbU/YA UhYf]UgDfcXi Wicb A 9A G%\$) ChYa U_]b[UbXGi gHJbU/]`]lm A 9A G%\$ \$ =blfc hc 5XX[hj YA Ubi ZJMi f]b[cZA UhYf]Ug A 9A G%\$) A UhYf]Ug8Yg][b
- *i* 6]ca UhYf]Uʻgʻfl ʻcZh YZc``ck]b[Wi fgYgŁF
 6=C9B; %+\$ =blfcXi Wijcb h; 7Y``6]c`c[m%
 6=C9B; %+%=blfcXi Wijcb h; 7Y``6]c`c[m%
 6=C9B; %\$+). =blfc h; 7Y``UbXA c`YW/`Uf`6]c`c[m
 @UvcfUrcfmHYWb]ei Yg
 6=C9B; %%`6]ca UhYf]UgʻUbX6]cWa dUi]V]`]hm
 =9 %&\$%6]ca UhYf]UgʻUbX6]cWa dUi]V]`]hm
- *i* 9bYf[m

9B; F %\$\$ =blfcXi Wijcb hc Bi WWUF 9b[]bYYf]b[9B; F %\$% i bXLa YbHJgcZBi WWUF FYUMicfg 9B; F %\$&Bi WWUF D`UbhHYWbc`c[m A 9A G%8&A UhYf]UgZcf 9bYf[m; YbYfUijcb UbXChcfU[Y A 9A G%8&A: i bXLa YbHJgcZA U[bYh]WA UhYf]UgUbX5dd`]WJijcbg A G9 &\$' ' A U[bYh]WDfcdYfhYgcZA UhYf]Ug

i 7ca di HJh]cbU'A UhYf]U'g'GVJYbW
9B; F %) %#&() % 9l d`cfUrcfm8UUJGVJYbW
9B; F %) ' #&() ' . 8UHJGVJYbW. GHLh]gh]W @YUfb]b[žA cXY]b[UbXDfYX]Vkjcb
A 9A G%8%#A G9 &&%27ca di HLh]cbU'A UhYf]U'g'GVJYbW
A 9A G%8) 'A UhYf]U'g'8 Yg][b
A G9 &%% BUbcgWYA cXY]b['UbXG]a i `Uh]cb

^{*6=}CG7=`\$%\$) UbX6=CG7=`\$%\$* Wb VYg Vg]li hXZcf 6=C9B; %\$+\$ UbX6=C9B; %\$+%7< 9A `\$' %` Cf[Ub]W7\Ya]gfm%]gUgc fYWa a YbXYXžVi hbchfYei]fYXžZcf h}gcdh]cb"

BchYUgch\YZc``ck]b[.

- j A C9 'hWb]W' YWbj Yg Wb 'bW XY &\$\$\$! Yj Y fl"YZ A Ught g Yj YHZ g V'Wbhc 'h Y Ud! dfcj U cZh YA C9 Dfc[fUa '8]fWbcf"
- j 7c!cd gli XYblg Wb YUfb h fYYfl ŁWYX]lg Zcf Uk f]hYb fYdcfhcb h Yff W!cd Yl dYf]YbWž k \]W a UniVYgi Vghli hXZcf cbYcZh YA C9 hWb]W YYMjj Yg'
- i I ddYf! Yj Y Yb[]bYYf]b[Wi fgYg Zica ch Yf Yb[]bYYf]b[XYdUfha Ybhg a UmVY gi VgH! h hXX Zcf A UhYf]Ug GVJYbWY UbX 9b[]bYYf]b[HYWb]W/ 9 YWij YgZ gi V'YWi hc h Y Ud! dfcj U cZh YA G9 Dfc[fUa 8]fYWicf"
- / HYWb]W/YYMj YgUYi gi U`mbchcZ2fYXXi f]b[h\YGi a a Yf HYfa "
- / Ghi XYblg a i gh\Uj Y Wa d`YhYX h\Y dfcdYf dfYfYei]g]hYg VYZcfY Ybfc``]b[`]b UbmcZh\Y hYWb]Wf YYMij YgUbXg\ci `X\Uj YUWi]fYX'i b]cf gfLbX]b["

 $\begin{array}{l} Chi XYbly k]g \ b[\ hc \ di fg Y ch Yf \ hWb] W \ YYM j Y \ Wc] W g a i g \ cVh]b \ h \ Y \ Uddfc j \ U \ cZh \ Y \ A \ C9 \ Dfc [f La \ 8] f \ Mc \ f'' \ \end{array}$

%"&"- ` FYei]fYX'9b[]bYYf]b['9`YVMjjYff%7ci fgYL

Gh Xyblg UfY fYei]fYX h Wa d`YhY cbY 9b[]bYYf]b['9`YMj Y Wi fgY" 5bmWi fgY cZYfYX k]h]b h YGk Ubgcb GWcc``cZ9b[]bYYf]b['a UnVY'i gYX h gU]gZnh]gfYei]fYa Ybhždfcj]XYX cb`mh Uh]hXcYg bchgi VgHbhJU`mfYd`]WhY Ubch Yf Wi fgY]b Ugi XYbh& Wff]W'i a "'H\Ydi fdcgY cZh Y 9b[]bYYf]b['9`YMj Y]g h U`ck 'gi XYbhg h Y ZYI]V]`]mhr 'Y d`cfY dcgg]VY UfYLg cZ]bhfYgh ci hgXYcZa Uhf]UggWbWUbXYb[]bYYf]b["

- j' =b`WbhfUghhc`h\YfYei]fYaYbhg'Zcf'UAC9`HYWb]WJ`9`YMijYžh\Y9b[]bYYf]b[`9`YMijY Wb`VY'Zfca`Ubch\YfYb[]bYYf]b[`dfc[fUaBg'gcd\cacfYWff]W'ia`f]'Y'ž]hXcYg'bch\UjY` hc`VY'bĺiddYf!`YjYÎ`WifgYL"
- / 5 7Zci fh\ A C9 HYWb]W/ 9`YMj Ya UniVYi gYXhc 7Z `7]``h\]gfYei]fYa Ybh'

%" 5XjUbWXGhUbX]b[UbXHfUbgZYf7fYX]h

 $\begin{array}{l} Ch XYblg hfUbgZff]b[`]bhc`h Y A YWUb]W`9b[]bYYf]b[`UbX A Uhf]Ug GVJYbW 8 YdUfha Ybh Zica `ch Yf`W^Y[Yg UbX`ib] Yfg]hJYg k]``\Uj Y h Y]f`UVXYa]WfYWfZg fYj]Yk YX Zcf`UXj UbWX gHbX]b[`UZhf`h Ym\Uj Y VYYb`UVVdhXX Zcf`UXa]gg]cb" 5 Xj UbWX gHbX]b[`Zcf`U I b]j Yfg]mi cZ D]HgVi f[\`Wi fgY`a YUbg h Uh U ghi XYbh fYW]j Yg hfUbgZff`WYX]h Zcf`h Uh Wi fgY" Cb`mh Y WYX]hg k]``hfUbgZff`Zcf`h Y Wi fgYZbchh Y[fUXYfYW]j YX`Uhh Y dfYj]ci g]bgh]h h]cbžVi h]b`U`` ch Yf YgdYMg]hUg]Zh Yghi XYbhIcc_h YWi fgYUhh YI b]j Yfg]mcZD]HgVi f[\'$

H\YXIMfa]bUjcb`cZUXjUbWX`głUbX]b[`]g`aUXYVmihYA9AG`IbXYf[fUXiUM`8]fYMcfž]b`UWVfXUbWYk]h\`GkUbgcb`GWcc``cZ9b[]bYYf]b[`dc`]WnUbX`W]hMf]UYgłUV]g\YX`VmihY 5WWX]HJicb`6cUfXZcf`9b[]bYYf]b[`UbXHYWbc`c[mfb69HL"

- j Cb`mWi fgYg]b`k \]W`h Y Udd`]Wbh fYW]j YX U [fUXY cZ Uh `YUgh &"\$\$`cb`U ("\$\$`gWY k]`` VY Wbg]XYfYX Zcf`UXj UbWX gHbX]b[ž UbX h Yb`cb`m]Z h Y Wi fgY Wb`VY i gYX hc`gU]gZnXY[fYYfYei]fYa Yblg"
- / 5Xj UbWX głUbX]b['Zcf 'Yb[]bYYf]b['cf 'Yb[]bYYf]b['gMXbWY Wi fgYg k]`` VY []j Yb cb`m]Z h YWi fgYg k YfYH_Yb Zfca 'Ub 569HUWIYX]hXYb[]bYYf]b['dfc[fUa "
- j 5Xj UbWX głUbX]b[Zcf a Uh Ya UłWg UbX głWbW Wi fgłg k]``VY Uk UFXYX hc h Y Yi hłoh h Uhh cgYWi fgłga UHW 8]Yff]W GWcc`cZ5fhg UbX GłWbWg Wi fgłg'
- j' < i a Ub]h]Yg UbX gc VJU gVJYbW Wi fgYg a i ghY]h Yf WffYgdcbX hc h cgY cb h Y Gk Ubgcb GWcc``cZ9b[]bYYf]b[£g Uddfcj YX`]ghcZ\i a Ub]h]Yg UbX gc VJU gVJYbW Y YWdj Yg cf a YYh h Y Gk Ubgcb GWcc``cZ 9b[]bYYf]b[£g fYei]fYa Ybhg Zcf Ub UWVdhUVY \i a Ub]h]Yg UbX gc VJU gVJYbWY YWdj YZUg XYhYfa]bYX'mh YI bXYf[fUXi UhY8]fYWfcf"
- j 5 a U]a i a cZ-* htubg2df WYX]hg a UmVY Udd]YX hck UfXg h Y XY[fYY f+) 1 cZh Y &; WYX]hg fYei]fYXZcf [fUXi U]cbL"

 $\begin{array}{l} Chi XYblg`lfUbgZtff]b[`Zfca `Y]h`Yf`Ub`]bgh]h`hcb`a U[bHJ]b]b[`U' #&dfc[fUa`k]h`hYCkUbgcb`\\ CWcc``cZ 9b[]bYYf]b[`cf`U`Wa a i b]hm`W``Y[Y`\U]b[`Ub`Ufh]W`Uh]cb`U[fYYa Ybh k]h`hY`\\ gWcc`k]``fYW[jYUXjUbWXgHbX]b[`]b`UWVfXUbWK]h`hcgY`U[fYYa Ybhg'' \\ \end{array}$

5XjUbWXD`UWaYbhf6DŁ7fYX]h

HfUbgZyf 7fYX]hZcf 7ci fgYgHU_Yb 5Zhyf 9bfc``a Ybh

Gi Xybig Ybfc ``YX`]b 'h YGk Ubgeb 'GWee ``cZ9b[]bYYf]b['a UnitJ_Y Wi fgYg Uich Yf i b]j YfgltJYg hc 'gLigZni [fUXi Uicb 'fYei]fYa Ybig eb 'm]Z h egY Wi fgYg UY Uddfej YX`]b 'UXj UbW Vmih Y I bXYf[fUXi UiY 8]fYWref" Gi Xybig 'fYglX]b[']b 'h Y D]HgVi f[\` UYU UY Y I dYWrX he 'H_Y U`` cZ h Y]f 'Wi fgYg Ui h Y I b]j YfglmicZ D]HgVi f[\ž i b Ygg h YfY]g U gdYVJU 'Wi fgY cZ2fYX Ui ebY cZh Y ch Yf 'UYUZci f!mYU 'W' Y] Yg'h Ui]g behU U'YUYUhh YI b]j YfglmicZD]HgVi f[\"GYY GYWJeb '%' '% Zef' a efY']bZefa Uicb 'eb' VKegg fY[]gMf]b['Ui D7< 9!a Ya Vff']bgi]hi ijebg'' Gi Xybig a UnitU_Y Wi fgYg Ui h Y'; fYYbgVi f[`UbX' >c\bghek b' Wa di gYg cZ h Y I b]j Yfglmi cZ D]HgVi f[\"BYF]b['UbX' Yb[]bYYf]b['UbX' Yb[]bYYf]b['gWbW Wi fgYg a i gh \U y' VYb' H_Yb' Zea 'Ub' 569HUddfej YXYb[]bYYf]b['dfc[fUa "

Cb`mh`Y`WYX]hg`k]```hfUbgZhf`Zcf`h`Y`Yei]j UYbh WUggž bch`h`Y`[fUXY`cf`[fUXY`dc]bh`Uj ! YfU Yž UbX`WYX]h`k]```cb`mVY`[]j Yb`]Zh`Y`gh`XYbh`fYW]j Yg`Uh`YUgh`&'\$`cb`U ("\$`gWVY" =h`]g` h Y ghi Xybhigʻ fYgdcbglV]`]hm hc'\Uj Y h Y]fʻ hfUbgMi]dh gybh hcʻh Y I bXyf[fUxi UhY CZJWž *' *` 6YbYXi a'< U`žUhih YWa d`Yh]cbʻcZh YWLggʻ

%" "% D7< 9 7fcgg!FY[]ghfUh]cb

7fcgg W^Y [Y UbX Wcgg i b]j Yfglmf Y]gf Uhcb]g U dfc [f Ua 'Xýg [bYX hc dfcj]XY Zcf 'Ybf]WYX XXi Wh cbU cddcfh b]h Yg Zcf i bXYf [f UXi Uh'g Uh UbmcZ h Y hb'] bg h h u Wa df]gY h Y D]h gvi f [\ '7ci bW' cb' <][\Yf' 9Xi Wh cb' fD7< 9Ł '7Uf bY]]Y A Y`cbž 7Uf ck '7c``Y [Yž 7\Uh Ua '7c``Y [Yž 7ca a i b]m 7c``Y [Y cZ 5``Y [\Ybm 7ci bh ž 8i ei YgbY I b]j Yfg h ž Dc]bh DUf_'7c``Y [Yž @UF cWY 7c``Y [Yž F cVYf h A cff]g 7c``Y [Yž D]h gvi f [\ 'H Yc`c []W' G'a]bU nž USX h YI b]j Yfg hmcZD]h gvi f [\'"I bXYf h Yh f a g cZh]g dfc [f Ua žZ ``!h a Y gi Xyb g Uh Ubmcb Y cZ h YgY]bg h h cbg Uf Y [f UbhX h Y cddcf h b]m hc 'bfc```Zcf 'Ua U]a i a 'cZg] 'WYX [hg dYf h f a Uh Ubm cZ h Y ch Yf'] bg h h cbg" 9UW']bg h h lob' dfcj]XYg h Y ch Yfg k]h ``]g y cZh cgY Wi fg Yg Uddfcj YX Vm XYd Uf ha Ybh WU fd Yfge bg 'Ug VY]b['cdYb' hc 'Wcgg f Y]gf Uhcb"' Gi W' Wi fg Yg a i gh Y gY Wh X Z f ca 'h cgY f Y i 'U`mUW WX [hX hck UX VUW U fYUH' dfc [f Ua gz USX U ghi Xybh f Y]gh f]b['Zcf' h Ya 'a i gh a Yh U``df Yf Yei]g]h g" Df]cf]hm]b f Y]gf Uhcb" [cYg hc h Ygh Xbhg cZh Y \cgh W``Y [Y" 7f YX]hg UbX [f UXYg UY H UbgZ ff YX"

H\YZc``ck]b[``]a]HLh]cbg'Udd`m

- *j* 7fcgg fY[]g fU]cb]g U U WYcb mXi f]b[h Y: U`UbXGdf]b[HMfa g'
- j I bXYf[fUXi UYgUbXdcgHVUW/U fYUY'gi XYblga i ghVYfY[]ghYfYXZcf UhcHJ cZUh YUgh %cWYX]hgf]bWi X]b[h YWcggfY[]ghUhcb WYX]hgt"
- / Ghi Xibhgʻa UmbchWicggʻfY[]ghif Zcf Wrifgiyg'U U'WYUnh\Y\ca Y]bghlh hlcb"
- ; Ghi XYbhg Wubbch i gY Wicgg fY[]ghfUh]cb hc fYdYUh Wri fgYg HU_Yb Uh h\Y I b]j Yfghm cZ D]hgVi f[\"
- / CbWUghi XYbh]g Ybfc``YX]b h\YA YWUb]W 9b[]bYYf]b[UbXA UYf]UgGVJYbW 8 YdUfh a Ybhž \Y#g\Y]g bch dYfa]hYX hc HU_Y Wi fgYg Uhh Y 7ca a i b]hn7c``Y[Y cZ 5``Y[\Ybm 7ci bhncf Ubnch Yf Hcc!nYU]bgHh Hcb UgdUfhcZ\]g#\Yf Yb[]bYYf]b[YXi WHcb"
- / Chi XYbhg a Umbchi gY Wicgg fY[]ghfUhcb hc hU_Y Wi fgYg h\UhUfY bch UWYdHU/Y Zcf Ub 9b[]bYYf]b[XY[fYY"
- j H\Y [fUX]b[gnghYa Zcf U Wicgg fY[]ghYYX Wi fgY]g XYhYfa]bYX Vmh Y W`Y[Y cf i b]! j Yfg]mih UhcZXfg h Y Wi fgY" H\Y ghi XYbha i ghUgc Zc``ck h UhgWcc`Bg dfcWXi fYg UbX XYUX]bYg Zcf UXX#XfcdžYhW

7fcgg fY[]gfU]cb HJ_Yg d`UW Xi f]b['h Y UXX#Xfcd dYf]cXž YbX]b['h Y `Ugh XLincZ h Y I b]! j YfglmcZ D]hgVi f[\fg`UXX#Xfcd dYf]cX" =bhYfYghX` gh XYbhg`g\ci `X` [c 'h `h Y 9b[]bYYf]b[' CZJW cZ 5Xa]b]gfU]cbž %%6YbYXi a '< U`ž Zcf U D7< 9 fY[]gfU]cb Zcfa `UbX`UXX]h]cbU`]bgffi Wijcbg'

7fcgg/W[^]Y[Y UbX Wicgg/i b]j YfglmifY[]glfUljcb⁻]g U dfc[fUa⁻XYg][bYX hc⁻dfcj]XY Zcf⁻Yb! f]WYX YXi WljcbU⁻cddcfli b]ljYg Zcf⁻i bXYf[fUXi Ulyg UhUbmcZh Y hlb⁻]bgljli ljcbg h UhWa ! df]gY h Y D]llgVi f[\ '7ci bW⁻cb⁻<][\Yf⁻9Xi Wljcb⁻fD7<9L⁻7UbY[]Y A Y⁻cbž 7U⁻ck⁻7c⁻Y[Yž 7\Uh Ua '7c``Y[Yž 7ca a i b]hm7c``Y[Y cZ 5``Y[\ Ybm7ci bhž 8i ei YgbY I b]j Yfg]hž Dc]bhDUf_ '7c``Y[Yž @UF cWY 7c``Y[Yž F cVYfh A cff]g 7c``Y[Yž D]hgVi f[\ 'H Yc`c[]W' GYa]bUfnž UbX h Y I b]j Yfg]m cZ D]hgVi f[\ '' I bXYf' h Y hYfa g cZ h]g dfc[fUa ž Z ``!h]a Y gii XYbhg Ui Ubm cbY cZ h Yg']bgh]ii h]cbg UfY [fUbhX' h Y cddcfhi b]minc 'Ybfc``' Zcf' U a U]a i a 'cZ g]l 'WYX]hg dYf' hYfa 'Ui UbmcZ h Y ch Yf']bgh]ii h]cbg'' 9UW']bgh]ii h]cb dfcj]XYg h Y ch Yfg k]h '`]ghg cZ h cgY Wi fgYg Uddfcj YX VmXYdUfa YbhWU[fdYfgcbg Ug VY]b['cdYb hc 'Wcgg] fY[]gfUh]cb''Gi W' Wi fgYg a i gh YY gY YMXX Zca 'h cgY'fY[i 'U' mUWIYX]hX hck UX VUW/U fYUhY dfc[fUa gž UbX' U ghi XYbh fY[]ghYf]b['Zcf' h Ya ' a i gh a Yfh U``dfYfYei]ghYg'' Df]cf]hm]b 'fY[]gfUh]cb'' [cYg hc 'h Ygi Xbhg cZh Y\cghW`Y[Y''7fYX]hg'UbX'[fUXYgUfYhfUbgZhfYX'

H\YZc``ck]b[^`]a]HLHcbgUdd`m

- / 7fcggffY[]gffUicb`]gUjU`WYcb`mXif]b[h\Y:U`UbXGdf]b[HMfag"
- j I bXYf[fUXi UYgUbX'dcgHVUWVU fYUY'gii XYbhg'a i ghVYfY[]ghYfYX'Zcf'UhcHU'cZUh'YUgh %&WYX]hgf]bWiX]b[h\YWcggfY[]ghUhcbWYX]hgt"
- / Ghi Xiblg`a UmbchWicgg'fY[]ghif Zcf WifgYgUjU`UVYUhh\Y\caY]bgh]h hcb"
- ; Ghi XYbhg Wabbch i gY Wicgg fY[]ghfUh]cb hc fYdYUh Wi fgYg HJ_Yb Uh h\Y I b]j Yfghm cZ D]hgVi f[\"
- / CbWUghi Xhhi]g Ybfc``YX]b h YA YWUb]W 9b[]bYYf]b[UbXA Uhf]Ug GVJMbW 8 YdUfh a Ybhž \Y#g\Y]g bch dYfa]hhX hc HU_Y Wi fgYg Uhh Y 7ca a i b]hn7c``Y[Y cZ 5``Y[\Ybm 7ci bhrcf Ubrich Yf H c!nYU]bgh]h hcb Ug dUfhcZ\]g#\Yf Yb[]bYYf]b[YXi Wh]cb"
- j Ghi XYbhg a Umbchi gY Wicgg fY]gffUjcb hc HJ_Y Wi fgYg h\Uh UfY bch UWYdHVY Zcf Ub 9b[]bYYf]b[XY[fYY"
- j H\Y [fUX]b['gnghYa 'Zcf'U Vicgg!fY[]ghYfYX Wi fgY]g XYhYfa]bYX Vmh\Y W``Y[Y cf'i b]! j Yfg]mih\UicZXfg'h\Y Wi fgY"H\Y ghi XYbha i ghUgc 'Zc``ck 'h\UigWcc`Bg'dfcWXi fYg'UbX' XYUX]bYg'Zcf'UXX#XfcdžYhW

7fcgg!fY[]g!fU!]cb`HJ_Yg`d`UW Xi`f]b[`h`Y`UXX#Xfcd`dYf]cXž YbX]b[`h`Y`Ugh XLmcZh`Y`I`b]! j`YfglmcZ D]ltgVi`f[`\fg`UXX#Xfcd`dYf]cX" =bhYfYg!XX`gti XYbIg`g`ci`X`[c`hc`h`Y`9b[]bYff]b[` CZ]W`cZ 5Xa]b]g!fU!]cbž %%6YbYXi`a`<U`ž Zcf`U`D7<9`fY[]g!fU!]cb`Zcfa`UbX`UXX]l;]cbU`]bg!fi`Wi]cbg'

% (I bXYf[fUXi UhYFYgcifWgK YVDU[Y

5 ' j UF]Yhm cZ fYgci fWg']g' Uj Uj UVY cb' h Y<u>I bXYf[fUXi UhY#Chi XYbh FYgci fWg'</u>dU Y cZ h Y XYdUfha YbHg'k YVg]hY''< YfYnci 'k]``ZbX

- j H\Y`UNghij Yfglobg cZh]g 5WXYa]WDfc[fUa `A Ubi Užh\Y 7i ff]W`i a `7\W}]ghžh\Y` GWYXi `YcZ7ci fgYCZXf]b[g\mHfa žYhW
- / GYa Yghif Wi fgYgWYXi `Yg'

- j 8 YdUfha YbHJ]bZcfa Uljcb fY[UfX]b[W!cd dUfh]V/dUbhgžh\YXYdUfha YbHJ gYa]bUfž [fUXi Uljcbž\i a Ub]h]YgUbXgcVJU gV/bWYYYMjj YgžYHW
- j JUF]ci gi b]j Yfg]miZ fa gZ f 5bh]V/dUNX; fUXi Uhcb 8UNZ; fUXi Uhcb 5dd`]Wh]cbž DYfa]gg]cb hc fY[]ghff Z fa cfYh Ub% WYX]hgžYhW

$7 \ UdhYf \&$

5 WXYa]WDc`]Wh

&"%; fUX]b[GnghYa

 $\begin{array}{l} H YI b] y fg | mcZD] HgVi f[\ i g Vg Ug Ub XU X `YHMf [fUXY gng Ha ž Ug XYgVi] VX `VY ck "5```cZh Y \\ Wi fg Yg H_Yb Zcf Zi `Zj``a YbhcZh Yf Yei] fYa Ybhg Zcf `U6UWY cf cZGV/MbW'] b 9b[] bYYf] b[`a i ghi VY H_Yb` k] h `h Y @YHMf `; fUXY Cdh] cbl h Y < #G#I ` UbX` G#B 7` [fUXY` cdh] cbg` UfY` bchi U`ck YX" H Y cb`m Yl Wdh] cb `] g Zcf `Wi fg Yg h fci [\`I b] y fg | mcZ D] HgVi f[\`=bhfbU] cbU` Dfc[fUa g z k \] W `UfY` H _Yb` dUgg#ZJ``fG#I E" H Ya] b] a i a `[fUXY` Zcf `g H] g ZMacfmWa d`Yh] cb`cZ UWi fg Y] g U [8 !'Î \\ \end{array}$

&"%% @YhhYf; fUXYgUbX; fUXYDc]bhg

H\YI b]j Yfglmg Yhnf [fUXYgUbXh\Y]f UggcVJUhX [fUXYdc]bhgUfYUgZc``ckg

; fUXYg; fUXYDc]bhg 5Ž 1 ("\$\$ 51 ("\$\$Gi dYf]cf 5/1 " "+) 6Ž 1 " "&) 61 " "\$\$A Yf]hcf]ci g 6/1 & "+) 7Ž 1 & & 71 & \$\$ 5XYei UY 7/1 & +) 8Ž 1 & & 8 1 & \$\$ 5XYei UY 8/1 \$"+) : 1 \$"\$\$`Ui fY &"%"&Ch\Yf; fUXYg =bWa d`YhYžK]h\XfUk bžF Yg][bYX

I dcb U ghi XYbHg Wa d`Yhjcb cZU Wi fgYz cbY cZh Y [fUXYg`]ghX VY ck a UnUddYUF cb h Y ghi XYbHg hfUbgWi]dh]b`]Yi cZh Y`YHYf [fUXYgX]gWggYXUVcj Y

- j 5 ĺ; Î [fUXY g][b]ZYg i bZb]g YX Wi fgY k cf_ Xi Y hc YI hYbi Uhb['VfWa gHbWg" Gh ! XYblg Ugg][bYX ĺ; Ĩ [fUXYg UY fYei]fYX hc Wa d YhY Wi fgY fYei]fYa Ybhg k]h]b h Y bYI hhYfa 'cZfY[]gfUhcb cf k]h]b h Y ha Y gdYVJZYX Vmh Y]bgffi Wicf" H Y]bgffi Wicf cZ h Y Wi fgY k]``Wa d YhY U[fUXY WUb[YU h cf]nLhcb Zcfa 'UbX gYbX]hhc h Y GWcc` cZ 9b[]bYYf]b['CZJW cZ 5Xa]b]gffUhcb Zcf dfcWgg]b["'=Z U ĺ; Î [fUXY]g bch fYa cj YX k]h]b cbYmYUžh Y]bgffi Wicf a UnWUb[Y]hhc Ub ĺ: Ĩ [fUXYZcf h YWi fgY'
- j 5b Í=Î [fUXY g][b]ZYg]bWa d`YhY Wi fgY k cf_ Xi Y hc h Y bUh fY cZh Y Wi fgYz W]b]W' k cf_ž cf]bWa d`YhY fYgYUFW k cf_]b]bX]j]Xi U [i]XUbW Wi fgYg cf gYa]bUfg"=h]g bch hnd]W`mi gYXZcf i bXYf[fUXi UYg"
- / 5 ÍFÎ [fUXYg][b]ZYgh UhUgh XYbhfYg][bYXZfca h YI b]j Yfghm
- ; 5 ´ÍK Î `[fUXY g][b]Z]Yg h\Un U ghi XYbh \Ug k]h\XfUk b Zfca `U Wi fgY fgYY K]h\XfUk U `VYck E'

&"&`K]h\XfUkU`

Hc fYW] Y U fYZ bXž U gli XYbh a i gh cZJYU'm Xfcd U Wi fgY Xi f]b[h Y hYfa Fg UXX#Xfcd dYf]cX''H\fci [\'h Y b]bh k YY_cZh Y hYfa žUgli XYbha Unk]h XfUk 'Zca 'U Wi fgY VnWa ! d'Yh]b['U A cb]hcfYX K]h XfUk U 'Zcfa 'U U'U'Y]b h Y I bXYf[fUXi Uh' Dfc[fUa 'CZJW'' H Y Wi fgY]bg/fi Wicf a i ghig][b h Y Zcfa ''K]h XfUk U 'Zcfa g 'Zcf Wi fgYg cZXfYX Vmh Y Gk Ubgcb GWcc ``cZ 9b[]bYYf]b['a i gh VY dfcWggYX h fci [\'h Y 9b[]bYYf]b['CZJW' cZ 5Xa]b]g/fU;cb''' K]h XfUk U 'Zcfa g 'Zcf 'Wi fgYg cZXfYX Vmh Y 8]Yff]W 'GWcc ``cZ 5flg 'UX' GY/bWg a i gh VY dfcWggYX h fci [\'h Uh gWcc 'B XYUbB' cZJW'' 5 'ÍK Î ' [fUXY k]``h Yb' VY Ugg][bYX Zcf 'h Y Wi fgY'' K]h XfUk U 'Zca 'U Wi fgY UZMf 'h Y b]bh 'k YY_ cZ h Y hYfa ']g dYfa]hhX cb mZcf '' H fYa Ym Y hybi U;b[' YfWa g{UbWg'' =h fYei]fYg h Y Uddfcj U 'cZ h Y 5ggcVJUh' 8YUb 'Zcf' 5WXYa]WUZJ]fg'

&"' 7U'W`Uhjcb`cZh\Y; fUXY'Dc]bh'5j YfU[Y

9UW WYX]h Wff]YX Zcf U `YHMf [fUXY]g Uk UFXYX [fUXY dc]bhg Ug g\ck b]b h Y HVY Uvcj Y' 5 gli XYbHg hfa [fUXY dc]bh U YfU Y ffMfa ; D5E]g h Y hchJ [fUXY dc]bhg YUfbYX Zcf h Y hffa `X]j]XYX Vmh Y hchJ WYX]hg Ugg[[bYX `YHMf [fUXYg'' 5 gli XYbHg Wa i `Uhj Y [fUXY dc]bh U YfU Y ffWa i `Uhj Y; D5E]g XYMfa]bYX VmX]j]X]b['h Y hchJ bi a Vff cZ [fUXY dc]bhg Vmh Y hchJ bi a Vff cZ WYX]hg Ugg[[bYX `YHMf [fUXYg'' Cb`mWYX]hg h Uh UfY hJ b' Uh h Y I b]j Yfg]m cZD]hfgVi f[\ UfYi gYX]b h YW/W Uhcb cZh Y[fUXY dc]bhU YfU Yg'

&"" "% 7ci fgYFYdYUbg

=Z U głi Xibh fYW]j Yg U [fUXY cZ Í 7.Î · cf · `ck Yf ·]b · U Wi fgYz fYdYU g h Y Wi fgY k]h]b · cbY WYbXLF mUfz UbX fYW]j Yg U VIHMf [fUXY h Y gYWbX Ha Yzh Yb `h Y gYWbX [fUXY k]```fYd`UW h YdfYj]ci g`mLgg][bYX [fUXY k \ Yb W/W U]b['h YWa i `U]j Y; D5"

- j' H\Y ha Y`]a]h Wb VY YI htbXYX]ZU ghi XYbh]g bch UVY hc fYdYUh U Wi fgY k]h]b cbY WYbXUF mYUF Xi Y hc YI htbi Uh]b['WfWa gHbWg ffY'['Zh Y Wi fgY k Ug cb mcZ2ffYX k \Yb h\Y ghi XYbh k Ug cb U W?!cd fcH.h]cbE!' Gi W Ub YI htbg]cb a i gh VY Uddfcj YX Vmh\Y 5ggcVJUhY8YUb Zcf 5WXYa]W5ZU]fg'
- / Bc gYei YbWW/wi fgY'a Um/VfYdYU/YX7cfW/X3/hU/21/fU\][\Yf!bi a VYfYXgYei YbW/W/i fgY\Ug VYYb gU/jg2U/wcf]`mW/a d`YhXXk]h\UÍ 7Î cf VYHYf"
- <u>j´ Chi Xybhg UfY cb`mdYfa]hhX hc`fYdYUh U Wi fgY lk]W</u> : cf`h Y di fdcgYg cZ h]g fi Yž [fUXYg cZÍFÎ cf`ÍK Î Xc bch Wi bh Ug fYdYUg'' =ZU gli Xybh fYW]j Yg U VyhYf [fUXY h Y h]fX hJa Yž h Yb`h Uh [fUXY k]```fYd`UW h Y lk c`dfYj]ci g`m Ugg][bYX [fUXYg k \ Yb` W/W`Uh]b[`h Y Wa i`Uhj Y; D5'' GdYMU dYfa]gg]cb Zfca `h Y 5ggcVUhY 8 YLb Zff 5 W. XYa]W5ZU]fg]g fYei]fYX hc`hU_Y U Wi fgY Zff`U Zci fh`hJa Y UbX`k]```[fUbhXx cb`mZff` Yl hYa YmYl hybi Uh]b[`YfWa ghLbWg'
- ;; fUXYg Zcf Wi fgYg h\Uh\Uj Y VYYb fYdYUhX k]``fYa Ub cb U ghi XYbHg hfUbgWi]dhž Yj Yb`]Zh\YmUfYbchi gYX]b XYhYfa]b]b[h\Y; D5"

&"(5WXYa]Wk cbcfg

 $\begin{array}{l} 5hhYYbXcZYUW'hfa \breve{z}hYUWXYa]WfYWfXgcZU``ibXYf[fUXiUYYX[fYYgiXbhg']b'hYGWcc``cZ9b[]bYYf]b[`UfYfYj]YkYXhc'XYhfa]bYY][]V]`]hmZcf'hY'HYfa '< cbcf'@]ghUbX'hY'8YLbBg'< cbcf'@]gh'GhiXYbhg'k \c'eiU]ZmZcf'Vch`\cbcf'`]ghg'k]```UddYUf'cb`mcb'hY'8YLbBg'< cbcf'@]gh'$

&"("% HYfa < cbcf @]gh

 $\label{eq:heat} \begin{array}{l} Hc \ VY \ Y \][\]VY \ Zef \ h \ Y \ Hv fa \ \ < cbcf \ \ @]ghz \ U \ ghi \ Xv bh a \ i \ gh \ U \ Y \ fv \ \ Vf \ Vf \ by \ X \ U \ hv fa \ \ \ [fu \ Y \ dc]bh \ U \ hv \ dc]bh \ dc]bh \ U \ hv \ dc]bh \ dc]b$

&"("& 8 YUbfg < cbcf @]gh

Hc VYY][]VYZcf h Y8YUbBg < cbcf @]ghžUgh XYbha i gh \UYfMzYUfbYXWa i `Uhj YUbXhYfa ` [fUXYdc]bhUjYfU Yg cZUh`YUgh' "&) žfR£Wa d`YhXUa]b]a i a `cZ' \$`WYX]hg cZUWXYa]Wk cf_` Zcf `YhYf`[fUXYg`Uhh YI b]jYfghmcZD]hgVi f[\žUbX`fl £Wa d`YhX`Ua]b]a i a `cZg]l `WYX]hg` cZk cf_Zcf `YhYf`[fUXYg]b h YhYfa `cZY][]V]`]hn'i

&") 5 WXYa]W8]gV/d`]bY

Hc VY WobglXYfYX]b [ccX UWXYa]WgHbX]b[žU gli XYbHg Wa i `Uhj Y; D5 a i gh VY Uh `YUgh &"\$\$ UbX h Y ghi XYbh a i gh VY a U_]b[`gUhgZUMcfmdfc[fYgg hck UfX YUfb]b[`Ub Yb[]bYYf]b[` XY[fYY '9UW Yb[]bYYf]b[`ghi XYbHg UWXYa]WfYWfX]gfYj]Yk YX'Uhh YYbX cZYUW hYfa "

&") "% K Ufb]b[

= \mathbb{Z} Ughi XYbh \mathbb{Q} ' hfa'; D5']g'Ygg'h Ub'&''\$\$ \mathbb{Z} Vih\]g#\Yf' Wai'Uhj'Y; D5']g'gh]``'[fYUhYf'h Ub'cf' Yei U'hc'&''\$\$ \mathbb{Z} h Yb'h Y'ghi XYbhk]``'fYW]j Y U k Ub]b['`YhhYf' \mathbb{Z} ca'h Y GWcc`'c \mathbb{Z} 9b[]bYYf]b[' h Uh \Y#g\Y']g']b'UWXYa]WX] \mathbb{Z} W'hz'k \]W'Wi'X'Yj Ybhi U`m`YUX'hc'dfcVUhcb']Z UWXYa]W dYf \mathbb{Z} cfa UbW'XcYg'bch]a dfcj Y''H\Yghi XYbh]g'gh]``']b'[ccX'UWXYa]WgHbX]b[''

&") "& DfcVUhjcb

5 ghi XYbhik \cgY *Wa i Uhj Y*; D5 Xfcdg VYck &"\$\$]g bc``cb[Yf`]b`[ccX`UWXYa]WgHbX]b[`UbX`k]```VY`d`UWX`cb`UWXYa]WdfcVU]cb" 5 ghi XYbh]g gi V'YWihc`gi gdYbg|cb`cf`X]ga]ggU`]Z\]g#\Yf`Wa i `Uhj Y; D5 fYa UJbgVYck &"\$\$ Zcf1kc WbgYWhj YhYfa g"

&") "' Gi gdYbg]cb

5**Z**Mf 'VY]b['g' gdYbXXXž gli Xiblg UfY bchY][]VY hc fYYbfc ``'Zcf 'cbY WYbXUf 'mYUž UZMf 'k \]W' h\YmUfYfYei]fYX hc Udd mZcf 'fY]bgHMa Ybhh\fci [\'h\YGk Ubgcb 'GWcc ``cZ9b[]bYYf]b['CZJW' cZ 5Xa]b]glfUhcb" Gli Xiblg fYhi fb]b['Zca 'UWXYa]Wgi gdYbglcb 'UfY fY]bgHMX cb 'UWXYa]W dfcVUhcb 'UbX'h\Yff 'UWXYa]WdYfZcfa UbW'k]``'VY'fYj]Yk YX'UMf 'YUW 'g' VgYei YbhhMfa "'=Zh Y gli XYbHg' Wa i `Uhj Y'; D5' fYa Ubg' VY'ck '&'\$\$'Zcf' lk c' WbgYWhJj Y hMfa gž \Y#g\Y k]``' VY' g' V'YMhc X]ga]ggU"

&") "(8]ga]ggU

8]ga]ggU`]gUZbU`UMacb''8]ga]ggYX`ghiXYbhgUfYbchY][]VYZcf`ZhifYYbfc``aYbh]b`h\Y GkUbgcbGWcc``cZ9b[]bYYf]b["

&"* FY]bghUhYa Ybh

5b' Yb[]bYYf]b['gi XYbh]b' [ccX' UWXYa]WgLbX]b['k\c'\Lg bch UHYbXYX hY I b]j Yfglmi cZ D]HgVi f[\'Zcf'h fYY WbgYWhj Y htfa gž UX'\Lg UHYbXYX bc'ch Yf']bgh]h hcb']b' hY]bhfj Yb]b['dYf]cXž k]``VY WbgXYfYX Zcf'fY]bghLh'a Ybh UZMf a U_]b['Ub'Udd']Whcb'hc'h Y I bXYf[fLXi UH'8]fYMcf" =Zh Y gh XYbh \Lg UHYbXYX Ubch Yf']bgh]h hcb'UbX Wa d'YhXa cfY h\Ub' %& WfXX]hgž h\Yb' h\Y gh XYbh a i gh fYUdd`m h\fci [\'h\Y I b]j Yfg]mfg CZZW cZ 5Xa]gg]cb'UbX':]bUbYJU'5]X]b'UWvfXUbW k]h'hY dfcWXi fY Zcf'hfUbgZff'Udd`]Wbhg Zca ch Yf W`Y[Ygcfi b]j Yfg]hfYg'

&"+'; fUXi Uh]cb F Yei]f Ya Ybhg

=b`cfXYf`hc`[fUXi UY`k]h`U6UWYcf`cZGVJYbW`]b`9b[]bYYf]b[`]b`h`YAUYf]Ug`GVJYbW`UbX` 9b[]bYYf]b[`dfc[fUa.

- % 5 ghi Xibha i gh\Uj Y`gUjgZUMcf]`mWa d`YhX`U``fYei]fYX`Wi fgYgžUg`XYZbYX`]b`7\Ud! hff%äZcfUhcHU`cZUh`YUgh%a; WYX]hg'
 - fL: 5```cZhYWi fgYgHJYb Zcf Z`Zj``a YbhcZhYXY[fYYfYei]fYa Ybhg a i ghVYHJYb k]h hY @YhYf; fUXYCdh]cb"H\Ycb`mYlWdh]cb]g Zcf Wi fgYg hfci[\`Ib]jYf! ghmcZD]hgVi f[\=bhYfbUh]cbU Dfc[fLa gžk\]W`UYHJYb dUgg#ZJ`fC# E
 - fM: 5Xj UbWX głubX]b['WYX]h UWYdhXX Vmh Y Gk Ubgcb 'GWcc` cZ 9b[]bYYf]b['a Um dUfh]U`mZ 'Z]``XY[fYYfYei]fYa Ybhgži d hc Ua U]a i a 'cZ- * WYX]hg'
 - fM/ Cb`mWYX]lg Uddfcj YX Vmh Y A YWUb]W 9b[]bYYf]b[UbX A Uhf]Ug GV[MbW I b! XYf[fUXi UhY8]fYMcf Wi bhhck UfXgh Y%, !WYX]hfYei]fYa Ybh
 - fXL Bc WifgY]b k]W U Í: Î cf U bcb! Yhhf [fUXY k U fYW]j YX Wb VY i gYX hc gU]gZnh Y%, !WYX]hfYei]fYa Ybh 5 a]b]a i a 18./Î "Yhhf [fUXY]gfYei]fYX
- &" 5 ghi Xybha i gh\Uj YUWa i `Uhj Y; D5 cZUh`YUgh&"\$\$"
- '"' H\Y k cf_`cZ h\Y gYb]cf`mYU`fU`a]b]a i a `cZ &* `WYX]hgL a i gh VY`Wa d`YhX`k \]`Y]b` fYg|XYbW`Uh h\Y Gk Ubgcb`GWcc``cZ 9b[]bYYf]b["'9l Wdh]cbg hc`h\]g fY[i `Uh]cb`a UmVY` [fUbhXXzf`U`]a]hXXbi a VYf`cZWYX]hg1\fci [\`dYh]h]cb`hc`h\YXYdUfha Ybh'

 $\begin{array}{l} \label{eq:chi} Gh XYblg a i gh Wa d`YhY Ub`5dd`]Wh]cb`Zcf`; fUXi Uh]cb`Zcfa`]b`hY hMfa`hUh hYm UY [fUXi Uh]b["`H\]g Zcfa`]g U U`UYY]b`hY I bXYf[fUXi UhY Dfc[fUa`CZ]W UbX cb`hY I b!` XYf[fUXi Uh]#Ch XYbhF Ygci fWg dU Y cZhY XYdUfha YbhBg k YVg]h"`5ZhYf Wa d`Yh]b[`hY Zcfa ž gh XYbhg h fb`]h]b`hc`hY 9b[]bYYf]b[`CZ]W cZ5Xa]b]gfUh]cb"Chi XYbhg g\ci`X dUnUhYbh]cb`h YUdd`]Wh]cb XYUX]bYghc U c]X`UHZYg"H\YXYUX]bYgUFYdcghX'cb`]bY" \\ \end{array}$

- j =h]g gi [[YghX h Uh ghi XYbhg gWYXi Y Ub Uddc]bha Ybh k]h h Y]f UXj]gcf hc fYj]Yk h Y]f fYWfXg]b h Y hfa dfYWX]b[h Y hfa ']b k]W h Ymd Ub hc [fUXi Uh2]b cfXYf hc a U_Y gi fY Yj Yfmh]b[]g]b cfXYf" =h]g h Y ghi XYbhgDfYgdcbg]V]`]hmhc a YhiU``cZh Y XYdUfha Ybh&gfYei]fYa YbhgZcf [fUXi Uh2c]
- j 8i f]b[hY UXX#Xfcd dYf]cX cZ hY hfa hUhU gli XYbh]g d'Ubb]b[hc [fUXi Uhž gli ! XYblg a i gli bch]Zn hY A 9A G 8 YdUfha Ybhg I bXYf[fUXi UhY 5WXYa]W5Xa]b]gffUcf" H\Y A 9A G I bXYf[fUXi UhY 8]fYMcf k] ```h Yb fYj]Yk YUW gli XYbhg fYW/fXg UbX Wa ! a i b]WhY hc hY gli XYbhk \UbbYYXg hc VY XcbY]b cfXYf hc Wa d'YhY \]g#\Yf [fUXi Uh/cb' fYei]fYa Ybhg" =h]g]a dcfHbh h\Uh h]g \UddYbg Xi f]b[`h\Y UXX#Xfcd dYf]cXz]b WgY h\YfUfYUbmWUb[YgfYei]fYXhc Ugli XYbhgUWXYa]WgWYXi `Y"

&"+"%GhUhi hYcZ@]a]hUhjcbg

5^{``}fYei]fYX`UMXYa]Wkcf_'Zcf'hY`6UWYcf'cZ`GVJYbW'XJ[fYY`]b'9b[]bYYf]b[ž]bWiX]b[' WifgYg'Zcf'k\]W`UXjUbWX!gHbX]b['WYX]h\Ug'VYb'[fUbhXžaighVY Wad`YhX`k]h]b'%& WbgYWh]jYWYbXLF'mYLfg''IbXYf'ibig'U'yfWagHbWgUghiXYbhaUnžk]h`hYUddfcjU'cZ hYIbXYf[fUXiUhY8]fYMcfžfYeiYghUkUjYfcZh]gdc`]Mn

7\UdhYf"

8Y[fYYCdh]cbg

6f]YZ XYgW]dh]cbg cZ gca Y cZ h\Y XY[fYY cdh]cbg 'U U`WY hc 'gh XYbhg ']b h\Y A YWUb]W` 9b[]bYYf]b[`'UbX`A UMf]Ug GVJYbW 8 YdUfha Ybh'UY'[]j Yb 'VY ck "`A cfY`]bZcfa UI]cbž]bWi X]b[` `]b_g hc 'gdYVJZ]Wk W glMg Zcf 'YUW cZ h\Y XY[fYY cdh]cbg `]gMX 'VY ck ž]g U U`WY cb`]bY Un \htdg ##k k k "Yb[]bYYf]b['d]hh'YXi #a Ya g'

' "% 7ccdYfUhjjY'9XiWUhjcb'Dfc[fUa

H\Y 7ccdYfUlj Y 9Xi Whob ff7c!cdLDfc[fUa 'UhD]hh]g cbY cZh Y a cgh Yl Vhjb['cddcfhi b]hJYg Uj Uj`Uv`Y hc 'Yb[]bYYf]b['ghi XYbhg'' 6mUhYfbUljb['k cf_ 'UbX gWcc``hYfa gž h\Y W!cd'dfc[fUa ' dfcj]XYg ghi XYbhg k]h\ fY`Yj Ubhž WU`Yb[]b[ž dUJX k cf_ 'Ugg][ba Ybhg k]h\ `cWž bUljcbUž cf`]bhYfbUljcbU Ya d`cmYfg'

H\Y dfc[fUa ']bh/[fUh/g U fcHJicb'cZ gWcc`'UbX'Ya d`cna Ybh h/fa g h\Ui YbUVYg h\Y WcdYfUij Y YXi Whicb'gi Xibh hc'Wa d`Ya Ybh \]g cf'\Yf'Zcfa U'WLggfcca 'IfUb]b['k]h.' UXX]h/cbU'hWb]W'_bck `YX[YZ\UbXg cb'Yl dYf]YbWZ UbX'ZbUb/JU'fYa i bYfUi/cb"'H\Y W! cd' [fUXi Uh' dcggYggYg h\Y a Ui f]mUbX'Ugg fUbW cZU a cfY gYLgcbYX'Ya d`cmYY UbX'h\Y U/]`]mi hc']bWfdcfUh'UWXYa]W_bck `YX[YUbX'h\Ycfm]bhc'dfUMJW''8i f]b['W!cd'fcHJicbgžgi XYblg' YLfb'Wa dYh]hj YgULf]Ygžk\]W'a U_Yg'h]gdfc[fUa Ugc'ZbUb/JU`mfYk LfX]b["

A YWUb]W '9b[]bYYf]b['UbX'A UhYf]U'g GVJAbW ghi XXbhg \Uj Y'h Y'cdh]cb 'cZi glb['h Y]f W! cd WYX]hg fĐB; F '%- \$£hck U'Xg cbY'cZh Y'hWb]W 'YYMjj Yg]b 'h YWff]W i a ždfcj]XYX h Ui U'hWb]W 'dUdYf]g gi Va]hhX hc 'h Y XYdU'ha Ybh''H Y [i]XY]bYg UbX'Xi Y XUhYg Zcf 'h Y W!cd' dUdYf 'UY Uj U'UVY cb' h Y I bXYf[fUXi UhY#Chi XYbh FYgci fWg' dU Y cZ h Y XYdU'ha Ybhg' k Wg]h''

 $H Y W !cd`cdhcb`]g U U W Y hc`U``Yb[]bYYf]b[`i bXYf[fUXi U Yg''Chi XYbhg`a i ghVY]b`[ccX' U WXYa]Wg HbX]b[`fa]b]a i a`&"$$; D5EUbXa i ghVYY][]VYhc`Wa d`YhY`Ua]b]a i a`cZh`fYY k cf_`hYfa g'' A cgh ghi XYbhg`VY[]b`Xi f]b[`h Y`gcd\ca cfY`mYU`UbX`Wa d`YhY`h Y`dfc[fUa`Xi f]b[`h Y`gyb]cf`mYU''Chi XYbhg`k \c`UY`]bhYfyg MX`]b`dUfh]WdUhb[`]b`h Y`W!cd`dfc[fUa`g\ci`X`WbhUMi h Y`7ccdYfUhj Y`9Xi Whicb`Dfc[fUa`CZ]Wz`cWhX`cb`h Y`Zfghi Zccf`cZ 6YbYXi a < U`''$

' "& 9b[]bYYf]b[A]bcfg

I bXYf[fUXi UY gli XYblg]b h Y A WUb]W '9b[]bYYf]b['UbX A UYf]Ug GV/YbW XYdUfha YbhWb WccgY hc 'Yb\UbW h Y]f 'YXi Whcb Vma]bcf]b[']b 'Ubch Yf 'Yb[]bYYf]b['UfYU cZ]bhYfyd' 9UW cZ h Y XYdUfha Ybhg]b h Y GWcc``cZ 9b[]bYYf]b['cZZfg Uh `YUgh cbY a]bcf" 8 YgW]dhcbg cZ h YgYa]bcfg UbXh Y]f fYei]fYa Ybhg UfYU U`WYcb`]bY'

' "' 5fhgUbXGWybWgA]bcfg

A UbmXYdUfha YbłU`a]bcfg UfY Uj Uj UVY]b dfc[fUa g cZXfYX Vmh\Y 8]Ylf]W GWcc``cZ5fhg UbX GV/YbWgž]bW X]b['UfW]hYMi fU ghi X]Ygž Wa di hYf gy/YbWž YWzbca]Wgž \]ghcfnž a Uh Y! a Uj}Wgž UbX d\ng/Wg'' Ghi XYbhg a i gh Wa d`YhY Uh `YUgh\UZ cZh\Y WYX]hg YUfbYX Zcf U a]bcf` Uhh\YI b]j Yfg]mcZD]hgVi f[\UbXa i ghWa d`YhYUa]bcf k]h\Uh`YUghU&"\$\$; D5"

'"(`7Yfh]Z]WhYDfc[fUag

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- / 7]j]`9b[]bYYf]b[UbX'5fW]hYMi fU'Ghi X]Yg
- / 7cbWydhiU:cibXLh]cbgcZAYX]VJbY
- / 9bYf[mFYgci fWI h]`]nLh]cb
- / 9b[]bYYf]b[Zcf < i a Ub]hm
- *j* 9b[]bYYf]b[G]a i `U]cb
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- / =bbcjUhlcbžDfcXiVn/8Yg[[bžUbX'9blfYdfYbYifg\]d
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'") 5fhgUbXGV}YbWg!9b[]bYYf]b[>c]bh8Y[fYYDfc[fUa

H Y 8 [Yff]W GWcc``cZ 5fhg UbX GVMbWg UbX h Y Gk Ubgcb GWcc``cZ 9b[]bYYf]b[`\Uj Y XYj YcdYX Ub i bXYf[fUXi UhY c]bhX{[fYY dfc[fUa h UhdYfa]]g gi XYbhg hc Wa V]bY U a Ucf]b Ufhg UbX gVMbWg k]h U dfc[fUa]b Yb[]bYYf]b[UbX h Yb fYW]j Y XY[fYYg Zca Vch h Y 8]Yff]W GWcc``cZ 5fhg UbX GVMbWg UbX h Y Gk Ubgcb GWcc``cZ 9b[]bYYf]b["Gh XYbhg Wb Udd`mZcf UXa]gg]cb]bhc h Y dfc[fUa `h fci [\`Y]h Yf h Y 8]Yff]W GWcc``cZ 5fhg UbX GVMbWg cf h YGk Ubgcb GWcc``cZ9b[]bYYf]b[UbXa i ghYYUXa]hhX]bhc Vch gWcc`g"

'"* '9b[]bYYf]b[!GWcc``c'Z9XiWb]cb 7Yfh]Z]Wb]cb`Dfc[fUa

9b[]bYYf]b['gi XYbbg a UmUdd`mZcf`UZZA\!mYUf`dfc[fUa`h\Uh`YUXg hc`a Uh\Ya Uh]Vgz [YbYfU` gyJYbVYz cf`d\ng]Vg hYUW]b['Wfh]ZWh]cb`Zca`h\Y GWcc``cZ 9Xi Wh]cb" Ghi XYbhg k \c`Wa ! d`YhY`h\Y dfc[fUa`UfY`ei U]ZYX`hc`hYUW`]b`h\Y 7ca a cbk YUh\`cZ DYbbgmj Ub]U" Ghi XYbhg`]bhhfYghXX]b di fgi]b[h\]gcdh]cb`g\ci`XUdd`mdf]cf`hc h\YgfufhcZh\Y]f´i b]cf`mYuf"

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'", '9a Yf[]b['@YUXYfgDfc[fUa

9a Yf[]b[`@YUXYfg]bhfcXi Wg'dUfh]V/dUbhg hc Zci f Z bXLa YbhU'g cZ`YUXYfg\]d/'gY'Z_bck `YX[Yz j Ui]b[`ch\Yfgz dYfgcbU`UVWi bhU]`]hnž UbX`]bhY[f]hnï @YUfbYfg Yld`cfY'h YgY hcd]Vg k \]`Y Vi]`X]b[`g_]``g`]b`[fci d`XnbUa]Vgz WbZ]Vvia UbU[Ya Ybhždck Yf`UbX`]bZi YbWzXjj Yfg]hnž Yh`]Vgz UbX``]ZY!k cf_d`Ubb]b["H\]g%!k YY_dfc[fUa'dfcj]XYg`YUfbYfg'k]h\cddcfhi b]h]Yghc.

- / 91 d`cfYUbXUggYggmci f``YUXYfg\]d`g_]``g`UbX'gmiY'
- *j* DfUMJWUbXYI dYf]a Ybhk]h bYk ``YUXYfg\]d`VY\Uj]cf"
- / FYMJjYZYXVUW_cbmcifghmYUbXVY\Uj]cf"
- / D`Ub Zcf mci f cb![c]b[`YUXYfg\]d XYj Ycda Ybh'

'"- ^{*}=bhYfbUhjcbU`9XiWUhjcb

 $\begin{array}{l} H Y Gk Ubgcb `GWcc ``cZ9b[]bYYf]b[`]g a U_]b[`UWbWfhX YZcfhhc `Yl dUbX gh XYbhgD_bck `! YX[Yh fci [\`]bhYfbU]cbU `YXi WL]cb'' 5g h Y k cf `X VYWa Yg]bWYUgb[`m]bhYfWbbYWX UbX `[`cVU]nU]cb']g U k Um cZ `]Zz Yb[]bYYf]b[`gh XYbhg a i gh i bXYfgHbX \ck `hc `cdYfUhY]b `U [`cVU ` a UbbYf ` hc ` fYa U]b `Wa dYh]hj Y'' H Y gWcc `fg dfc[fUa g dfcj]XY cddcfh b]hJYg `Zcf `gh XYbhghc VfcUXYb h Y]f `\cf]ncbg]b bi a Yfci gk Ung'' \\ \end{array}$

' "%\$ FYW[j]b[; fUXi UhY 7fYX]h

5b'i bXYf [fUXi UY gli XYbhk \c]bMbXg hc Wbh]bi Yhck UXg Ub UXj UbWX XY[fYY a UmUffUb [Y hc gWYXi YU`]a]hXxbi a VYf cZWi fgYg Zcf [fUXi UY WYX]hXi f]b['h Y bYl hhc 'h Y`UghHyfa 'cf' ZbU' hYfa 'cZfY[]gfUh]cb 'Zcf' h Y 6"G"' XY[fYY' 5ddfcj U`k]`` VY [fUbhXx cb`m]Zh Y gli XYbHg' htH' dfc[fUa 'Zcf' h Y hYfa 'XcYg bch Yl WYX'% 'WYX]hg'' 5` a U]a i a 'cZ * 'WYX]hg Wb 'VY Udd`]YX hc 'U a Ughtfig XY[fYY' dfc[fUa '' H\YgY WYX]hg 'k]`` cb`m Udd`m hc '[fUXi UH' XY[fYY' fYei]fYa Ybhg'

' "%% 7ca V]bYX`@]VYfU`5fhg' '9b[]bYYf]b[' #& Dfc[fUa g`k]h\`Ch\Yf`7c``Y[Yg`UbX`I b]jYfg]h]Yg

 $\begin{array}{l} h Y Gk Ubgeb GWee^{\circ} cZ 9b[]bYf]b[^{Ug} Xj YedYX Wa V]bYX^{VfU} Uflg UbX Yb[]bYf]b[^{\circ} c]bHXI[fYY dfc[fUa gk]h^{Ubi a Vff^{U}} cZUWWX]hX^{V}VfU Uflg W^{Y}[Yg UbX i b]j Yfg]J}Yg^{U} H^{Y}g' dfc[fUa g UfY hol]W^{O}mfYZffYX hc^{Ug'} #& dfc[fUa g g]bW h^{Y}g ii Xybh]b]hU^{O}mYbfc^{\circ}g Uhh Y^{V}[YfU^{U}Uflg]bgh]h hebz Wa d^{Y}hb[^{U} U h fYY mYU^{U}gfi Wi fYX dfc[fUa "'H^{cgY} Zfgh h fYY mYUg i g U^{O}m)bW XY h^{Y} [YbYU^{U}Yi Wheb fYei]fYa Ybhg Zcf^{O}h^{Y}]VfU^{U}Uflg XX[fYYz gdWZ]WWi fgYg]b^{U}My fY g' U^{O}m]bW XY h^{Y} [YbYU^{YX} Wheb fYei]fYa Ybhg Zcf^{O}h^{Y}]VfU^{U}Uflg XX[fYYz gdW]ZWWi fgYg]b^{U}My fy cZWbWbhfUhcb^{V}fYei]fYX Zcf^{U} Yb[]bYf]b[^{O}dfc[fUa gz UbX h^{Y}Wi fgYg bYWggUmZcf^{U}WdHbW^{O}h^{Y}]VfU^{U}Uflg [bg]hh hebz h^{Y}g i Xybhhh Yb^{U}dd^{Y}g Zcf^{O}h Yfj]]Yk^{V}Wa a]hhY^{U}hh^{Y}]VfU^{U}Uflg]bgh]h hebz h^{Y}g i XybhgdYbXg h^{Y}ZbU^{U}h c^{M}fg]b^{O}h^{Y}A YWUb]W^{V} 9b[]bYf]b[^{"'=}ZUWWdhXzh^{Y}g i XybhgdYbXg h^{Y}ZbU^{U}h c^{M}fg]b^{O}h^{Y}A YWUb]W^{V} 9b[]bYf]b[^{U}fc[fUa "$

5hih Y fYei YghcZh Y gh XYbhž \]g cf `\Yf Gk Ubgcb GWcc``cZ9b[]bYYf]b[`UWXYa]WfWdfX k]```VY Zcfk UXXX hc h\Y`]VYfU`Uflg]bgh]h h]cb Zcf Yj Ui Uh]cbž UbX U`]VYfU`Uflg XY[fYY k]``` VY Uk UXXX`]b`UWdfXUbW k]h`h\Y dc`]WhcZ h\Y`]VYfU`Uflg`]bgh]h h]cb" H\Y Yb[]bYYf]b[` XY[fYY k]``VYUk UXXXi dcb Wa d`Yh]cb cZh\YYb[]bYYf]b[fYei]fYa Yblg'

=bhfYghX gli Xhblg g\ci `X VY fYZhffYX hc h Y 8]fWhcf cZ: fYg\a Ub Dfc[fUa g Zcf gdWJZ]W]bZcfa Uhcb UbX fYei]fYa Ybhg'' H\Y ' #& U fYYa Ybhg UbX Uh]W Uhcb U fYYa Ybhg g\ci `X VY Zc``ck YX j YfmWcgY nh =Z gli Xhblg HU_Y Wi fgYg h\Uh UfY bch `]ghX cb h Y ' #& U fYYa Ybhž h Y WLggYg a cgh`]_Y nk]``bchlfUbgZf" 5DD9B8=79G

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	'	7caaib]WuhjcbG_]``g9`YWujjY	
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 $\label{eq:hermitical_strain} \begin{array}{l} Hc^{}Ugg]gh^{}mci^{}]b^{}cb[^{}hfa^{}gWYXi^{}Yd^{}Ubb]b[^{}zU^{}hbHJhj^{}Yhfa^{}Nhfa^{}]gh]b[^{}cZWi^{}fgY^{}cZi^{}Zf]b[^{}g^{}]g^{}dfcj^{}]XYX^{}VY^{}ck^{''}H^{}]g^{}gWYXi^{}Yk^{}]^{}VY^{}gdYVJU^{}m^{}YdZi^{''}hc^{}ghi^{}Xbhg^{}k^{}c^{'}XYJXY^{}hc^{''}bfc^{'''}]b^{}h^{}YW!cd^{}dfc[^{}fUa^{''}]$

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Bia VYf	HYfa	HYfa	HYfa
9B; F\$\$ & %	i	i	i
9B; F\$%)	i	i	i
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9b[f"'9`YMdj Yg	i	i	i
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- j BchYhUž]b [YbYfUž A Uhf]Ug GMMbW UbX 9b[]bYf]b['HYWb]W 9 YMj Yg UfY cb m cZMfYXXi f]b[hY: U`UbXGdf]b['HYfa g'
- j H\]g]g U hhbhhhj Y gWYXi Y h\h]g gi V'YMi hc WUb[Y'' < ck Yj Yfž WUb[Yg k]`` bch VY a UXYk]h\ci hUddfcdf]UhYUWia a cXUhcb Zcf ghi XYbhgD1]gh]b[d`Ubg'

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: =F GHH9F A Gi V/YWi 7< 9A \$- *\$; Yb"7\Ya "Zcf 9b[f"% A 5H: \$&&\$ 5bU"; Yca Yfm/ 7UW% D: MG\$%(D\ng"Zcf CW// 9b[f"% 9B; F \$\$%ebfc"hc 9b[f"5bUng]g GPI EO R2432"Ugo kpct"kp"Eqo r qukkqp 9B; F \$\$, % fYg\a Ub'GYa]bUf	7fYX]hg ' ((' <u>\$</u> %	G97CB8 H9FA Gi V^YWi 7< 9A S- +S; Yb"7\Ya "Zcf 9b[f"& A 5H< S& S5bU"; Yca Yfm/ 7UW& D< MCS%) D\ng"Zcf GW// 9b[f"& 9B; F \$S%&9b[f"7ca di h]b[GPI EO R2634'Gpi t0Eqo o wpkeckqp 9B; F \$S, &: fYg\a Ub GYa]bUf	7fYX]hg ' ((' <u>\$</u> %
H< =F 8 H9F A		: CIFH< H9FA	
Gi Ų YYM	7fYX]hg	Gi Ų́́YVM	7fYX]lıg
A 5Hk \$&(\$ 5bU"; Yca Yfm? 7UW	(A 5Hk \$& \$ 8]ZZAFYbhJU 9ei Uljcbg	/ 1 12 x jig
A 5Hk \$& \$ A Uf]Wg/ @bYU 5 [WfU	1	9B; F\$%) CHLIWE/ A YW"A UNF"&	,
A 9A C\$\$& =bfc"hc A Uhf]UgCMMbW	,	9B; F\$\$8% DfcVU[`]hm' Ghh'Zcf 9b[f"	,
9B; F\$%) $GHHWZ/AWW"AUMf"%$	1	A 9A G\$\$(% A Uhf [UgDfcWgg]b]	,
A 9A GSS (=bhc"hc A 9 8 Yg[b]	1	A 9A G\$\$(, H\Yfa cXnbUa]VgcZA Uhyf]Ug	'
A 9A G%,) 8 YdUfha YbhU GYa]bUf	<u>\$</u>	J wo cpky IUqe0Uek0Grgevkxg	'
	%	A 9A G%,) 8 YdUfha YbHU GYa]bUf	<u> </u>
			%
: =: H< H9FA		G=LH< H9FA	
Gi V/YVM	7fYX]lg	Gi V/YVM	7fYX]lg
A 9A G%\$% 91 dYf]a YbHU A YfAcXg]b A G9	10	A 9A G%\$%% Ghfi Wat/ Dfcd"@UV	10
A 9A G%) & < YUhUbXA UggHfUbgZaf	'	A9AG%& AYWUb]W/8Yg[b%	'
A9AG%\$)' GhfiWarcZ7fngehUg∕8]Z2fUMar	'	A 9A G%s*′ D∖UgYHfUbgZcfa Uhcbg	'
A 9A G%), 9`YMfca U bYHWDfcd"A UMf"		A 9A G%+\$ A WW"6Y\U]cf cZA UMf]Ug	'
A 9A $G(\mathfrak{s})$ - D\UgY9ei]`]Vf]U	Ċ	Gpi kpggt kpi 'Grgevkxg	ò
A 9A G‰,) 8 YdUfha YbHU GYa]bUf	<u>\$</u> %	A 9A G%,) 8 YdUfha YblU GYa]bUf	<u>\$</u> %
	/ 9		/ 9
G9J9BH< H9FA		9≕, < H< H9FA	
Gi V/YVM	7fYX]lg	Gi V/YVM	7fYX]hg
A9AG%5'\$ AUM_f]UGYYMajcb	'	A 9A G%\$('GYb]cf 8 Yg][b Dfc^YWM	'
A 9A G% + GYb]cf A UMf"F YgYUFW Dfc^"	1	O UG'Vgej plæch'Gngevkxg	'
O UG'Vgej plæct/Grgevlag	'	O UG'Vgej plæch'Grgevlag	'
J wo cpk/ IUqe0Uek0Gngevkxg	'	J wo cpk{ ILqe0Uek0Gngevkxg	'
J wo cpk/ ILqe0Uek0Grgevkxg	'	J wo cpk/ IUqe0Uek0Grgevkxg	'
A 9A G%,) 8 YdUfha YbHU GYa]bUf	<u>\$</u>	A 9A G%,) 8 YdU'ha YbHJ GYa]bUf	<u>\$</u>
	%		%

5ddYbX]l 8 ! 7c!cd GWYXi Y: cfa

7i ffYbhGłli gfMfWYcbYŁ Gcd\ca cfY&>i b]cf % >i b]cf &GYb]cf %						
	Нст	Urtkpi	Uno o gt			
<i>№</i> ₩UF %						
ŃMUF &						
NMUF"						
ЙМИР`(
MMUF)						
/c!cd 5Xj]gcfBgG [1 In XYbHgG [bUn fY						

5bmWUb[Yg]bgWYXi`]b[*oww*VYUddfcjYXVmncifZW`hmUXj]gcf"H\YW!cdcZZW k]``bchVYfYgdcbg]VYZcfghXYbhgk\cXYj]UYZca h\Y]fgWYXi Ygk]h\cihXYdUfhaYbHU` UddfcjU"

• •

5ddYbX]l '9 '! 'GUa d`Y'A G9 '7c!cd'GWYXi `Y

Uwwfgpv'Pcog Fgrctvogpv≪ Cpvkekrcvgf"E	g< .q/qr 'Uvctv'F cvg<		
Ewttgpv'Ugo gu	vgt "Uc wu'*ekteng"qpg+< '6 % ''	7 vi ''	8 [.] '' 9.'
	Hcm	Urtkpi	Uno o gt
[gct '3	EJ GO 2; 82 O C VJ 2442 RJ [U2396 GP I T2233	EJ GO 2; 92 O C VJ 2452 RJ [U2397 GP I T2234	
	GPIEOR2432	GPIEOR2634	
[gct ''4	O C VJ 2462 O C VJ 24: 2 GP I T2357 O GO U2245 O GO U2246	O CVJ 24; 2 GP I T2243 GP I T2367 O GO U2263 O GO U226:	Yqtm Tqvcvkqp
[gct '5	O GO U3232 O GO U3275 O GO U327: O GO U327; Uqe0UekOIJ wo 0	Yqtm Tqvcvkqp	O GO U3274 Gpi t 0Grgevkxg Uqe0Uek0U wo 0 Uqe0Uek0U wo 0 Uqe0Uek0U wo 0
[gct '6	Yqtm Tqvcvkqp	O GO U3233 O GO U324: O GO U3285 O GO U3292 O UG'Vgej ØGnge0	Yqtm Tqvcvkqp ∛Qrvkqpcn⊬
[gct '7	O GO U3252 O GO U3265 O GO U329; <i>O UG'Vgej OGrge0</i> Uqe0Uek0IJ wo 0		
7c!cd 5Xj]gc Gh XYbHgG[[1	f ig :G][bUri fY bUri fY		8UHX

5bmWUb[Yg]b gWYXi `]b[o wwVYUddfcj YXVmrci f ZWVmUXj]gcf"H\YW!cd cZJW k]``bchVYfYgdcbg]VYZcf ghi XYbhgk\cXyj]UhYZfca h\Y]f gWYXi `Ygk]h\ci hXYdUfha YbHU` Uddfcj U"

Uwf gpv'P co g<	
F gr ct vo gp v<	
Cpvkekr cvgf 'Eq/qr 'Uvctv'F cvg<	

Ewttgpv'Ugo guvş	gt"Ucwu™ekterg"qpg≺	6 _{vj}	7 _V j	8vj	9_{vj}
	Нст		Urt kpi	U	no o gt
[gct '3"	EJ GO 2; 82 O CVJ 2442 RJ [U2396 GP I T2233 GP I EO R2432	(EJ GO 2; 92 D C VJ 2452 RJ [U2397 GP I T2234 PI EO R2634		
[gct '4	O CVJ 2462 O CVJ 24: 2 GPI T2357 O GO U2245 O GO U2246		Yqtm Tqvcvkqp	GP GP Eqo	2VJ 24; 2" I T2367 I T2243 o OUnkmu0 VUekOUJ wo
[gct '5	Yqtm Tqvcvkqp	(D GO U2263 D GO U226: D GO U324: D GO U3292 pi t ØGngevkxg		Yqtm qvcvkqp
[gct 'b	O GO U3232 O GO U3252 O GO U3275 O GO U327: O GO U327;	0 .01 .01	D GO U3233 D GO U3285 IG'Vgej OGrge0 IG'Vgej OGrge0 geOUekOU wo 0	0 0 0 0 Uqe0	0 U3265 0 U3274 0 U329; Uekalj wo Uekalj wo
[gct '7					
7c!cd 5Xj]gcf Chi XYbHgG[[b	₿G[[bUhi fY Uhi fY			8UHX. 8UHX.	

5bmWUb[Yg]b gWYXi `]b[*o ww*VYUddfcj YXVm**nc**i f **ZW**'mUXj]gcf"H\YW!cd c**ZJW** k]``bchVYfYgdcbg]VYZcf ghi XYbhgk\c XYj]UhYZfca 'h\Y]f gWYXi `Ygk]h\ci hXYdUfha YbHU` Uddfcj U"