

## +%'ı 'XYg'[ YgUa hYb '[ YgdYffhYb 'K Yfhg j YfXi bghYb ']b '%&'A cbUhYb ' '8YZ]

8]Y XYnYbhfu`]g]YfhY: ]bUbn]Yfi b[ fKYZ]Ł]ghrk Y]hYf\]brh]YZ']b

XYf'?fmdhck À\fi b[ gÒ\_cbca ]Y j Yfk i fnY`hžXU'XUg

2 \_cgmghYa XYb 6Ybi hnYfb Y]bY j Yfk U\fi b[ gZfY]Y

A Ò[ `]WX\_Y]h'V]YhYhžX][ ]hU`Y J Yfa Ò[ Ybgk YfhY

Ui gni hUi gWXYbž?fmdhck À\fi b[ Yb ni 'j Yf`Y]\YbžGhUV`YWc]bg

Ui gni [ YVYb i bX j cb '5fV]hfU[ Y ni 'dfcZ]h]YfYb" =a

?fYX]hgY\_hcfj cb '8 YZ]'\Uh'g]WX ']b 'XYb '`YhnhYb' '% 'A cbUhYb

j ]Y``j YfAbXYfhžXU'?fYX]hUbk YbXi b[ Yb 'k ]Y 'XUg'5bWXcf!

Dfchc\_c``j cb 'HYffU'XYb'GhUi V'VY]» Yb i bX '+%ž-) 'i 'XYg']b

8 YZ]!?fYX]hdfchc\_c``Yb'Y]b[ YgWX`cggYbYb'; YgUa hk Yfhg

j YfXi bghYh'g]bX"'J cb'' + A fX"'' 'V]g'%\$ 'A fX"'' .8]Y 'Hcd') 'XYf

8 YZ]!?fYX]h[ YVYf'XUa U`g'i bX'\Yi hY @YhnhYg'\J\fi a 'X]YgY

NY]h'\]Y`hYb'XYnYbhfU'Y': ]bUbn\_fYX]hdfchc\_c``Y'Y]bYb

; YgUa hk Yfhj cb'' +ž( %'A ]``]UfXYb'I G!8c``Uf'fHJ @\Zi bX'XUg

8 YZ]!Dfchc\_c``'/ Ua d\Y``]d/

8]Y XYnYbhfU`]g]YfhY: ]bUbn]Yfi b[ 'fXYZ]Ł']gh'k Y]hYf\]b'h]YZ
]b XYf'?fmdhck À\fi b[ gÒ\_cbca ]Y'j Yfk i fnY`hžXU'XUg

2 \_cgmghYa 'XYb'6Ybi hnYfb'Y]bY'j Yfk U\fi b[ gZfY]Y

A Ò[ `]WX\_Y]h'V]YhYhž'X][ ]hU`Y'J Yfa Ò[ Ybgk YfhY

Ui gni hUi gWXYbž'?fmdhck À\fi b[ Yb'ni 'j Yf`Y]\Ybž

GhUV`YWc]bg'Ui gni [ YVYb'i bX'j cb'5fV]hfU[ Y'ni 'dfcZ]h]YfYb''

=a '?fYX]hgY\_hcf'j cb'8YZ]\Uh'g]WX']b'XYb'`YhnhYb'%&

A cbUhYb'j ]Y`'j YfÀbXYfhž'XU'?fYX]hUbk YbXi b[ Yb'k ]Y'XUg

5bWXcf!Dfchc\_c``'j cb'HYffU'XYb'GhUi V'VY]»Yb'i bX'+%ž-)

I 'XYg']b'8YZ]!?fYX]hdfchc\_c``Yb'Y]b[ YgWX`cggYbYb

; YgUa hk Yfhg'j YfXi bghYh'q]bX''

## $Jcb'' + AfX''' V]g'\% AfX''' . 8]Y'Hcd') XYf 8YZ]!?fYX]h[YVYf'XUaU`g'ibX'\YihY$

@YhnhYg'\\fi a 'X]YgY'NY]h'\]Y`hYb'XYnYbhfU'Y
: ]bUbn\_fYX]hdfchc\_c``Y'Y]bYb'; YgUa hk Yfh'j cb'' +\(\frac{z}{\infty}\) \[ \frac{1}{2}\]UfXYb
I G!8c``Uf'fHJ @\(\frac{z}{\infty}\) bX'XUg'8YZ]!Dfchc\_c```5Uj Y'Xca ]b]YfhY'a ]h
%\(\frac{z}{\infty}\) +\(\frac{A}{2}\)]UfXYb'I G!8c``Uf''9]b'5fW\]j "cf['\(\frac{GW\}{M}\) bUddgW\(\hat{i}\) gg'j ca
%\(\frac{z}{\infty}\) Uf'\(\frac{z}{\infty}\) [h\(\frac{z}{\infty}\)][h\(\frac{z}{\infty}\)][h\(\frac{z}{\infty}\)][h\(\frac{z}{\infty}\)][h\(\frac{z}{\infty}\)][h\(\frac{z}{\infty}\)][h\(\frac{z}{\infty}\)]Y'HJ\(\theta\)'\(\frac{z}{\infty}\)]'\(\frac{z}{\infty}\)][ghYb
8YZ]!?fYX]hdfchc\_c``Y'j ca '\(\frac{z}{\infty}\)"\(\frac{z}{\infty}\)"

8]Y ZØbZ'k]Wkh][ ghYb '? fYX]hd fc hc\_c ``Y 'b UWk'; YgUa hk Yfhž'X]Y 'Ua %\$"' $\pm$ Ubi Uf'&\$&&'[ YgdYffh'k i fXYb"'

8]Y'ZØbZ'k]W\h][ghYb'?fYX]hdfchc\_c``Y'bUW\'; YgUa hkYfhž'[YgdYffhUa'%+"'\JbiUf'&\$&' "'

5VYf']a 'A U]'&\$&&'`ÒghY'g]W\'I GH'j cb'gY]bYf'%!8c``Uf!DUf]hÀhži bX 5bW\cf'\À`h'\Yi hY'bi f'bcW\'fi bX'&'A]``]cbYb'8c``Uf"'7ca dci bX\]Y`h'XUa U`g'a ]h', ž\$- 'A]``]UfXYb'I G!8c``Uf'X]Y'Xf]hh[ fÒ» hY'HJ@']b6Yni ['Ui Z'8YZ]!@YbX]b[!Dfchc\_c``Y"'5a '%+"'\Jbi Uf'&\$&' ']gh'XYfHJ@'jcb'7ca dci bX'Ui Z'%ž,) 'A]``]UfXYb'I G!8c``Uf'[YgW\fi a dZh"

8 Ugʻnk Y]h[fÒ» hYʻ8 YZ]!@YbX]b[!Dfchc\_c```]ghʻ\Yi hYʻ¾ ghʻYbXʻa]h
' ž\$' 'A]``]UfXYbʻI G!8 c``Uf"'8 Ugʻ]bʻHfcbʻUbgÀgg][Yʻ¾ ghʻYbXʻgh]Y[
j ca 'g]YVh[fÒ» hYbʻ8 YZ]!@YbX]b[!Dfchc\_c```HJ@'Ui ZʻXUgʻnk Y]h[fÒ» hY
Ui Zʻ']bXYa 'Ygʻj cbʻ%ž+&'A]``]UfXYbʻI G!8 c``UfʻUi ZʻXYfnY]hʻ'
A]``]UfXYbʻI G!8 c``UfʻgdfUb["'¾ ghʻYbXʻ]ghʻY]bYʻXYfʻk Yb][Yb
5bk YbXi b[YbʻZØfʻXYnYbhfU`]g]YfhYʻ: ]bUbn\_fYX]hYžʻX]Yʻ]bʻXYb
`YhnhYbʻ%&'A cbUhYbʻY]bYbʻ5bgh]Y['j YfnY]WXbYhY"

8]Y'j ]Yfh!'i bX'ZØbZh[fÒ» hYb'8YZ]b]YfYf'XYg'`YhnhYb'\*J\\fYgž
5VfUWUXUVfU'i bX'7fYUa :: ]bUbWYž'g]bX'b]W\h'a Y\f'i bhYf'XYb
YfghYb'ZØbZ'i bX'k i fXYb'Xi fW\'JYbi g'i bX'A cfd\c'YfgYhnh'''7fYUa
: ]bUbWY'`]Y[h'Yhnh'Ui Z'XYa '&\$"'D`Uhn'i bX']gh'j cb'&ž%('A]``]UfXYb
I G!8c``Uf'Ui Z'XYfnY]h'(&ž-('A]``]cbYb'I G!8c``Uf'[YZU``Yb"

 $K\ Ug\ XYb\ Yb\ G]Y\ \emptyset VYf\ X]Y\ 9fgWX\ \emptyset hhYfi\ b[\ XYg\ 8\ YZ]!\ @Yb\ X]b[\ !\ Dfc\ hc\ c\ g\ ]b\ XYb\ YhnhYb\ %. A\ c\ b\ UhYb\ 3'HY]\ Yb\ G]Y\ i\ b\ g'=\ fY$  ;  $YXUb\ Yb\ ni\ X]YgYa\ H\ Ya\ U']a\ ?ca\ a\ Yb\ hUfVYfY]WX\ i\ b\ hYb\ a\ ]h"$ 

.

>Ja]Y'FYXaUb'

.

•

6] `X b U W k Y ] g. 'G\ i hh Y f g h c  $W_{\underline{z}}$  'D] I U V U m  $\underline{z}$  'K ]\_] 7 c a a c b g

 $6Y^{}]YVhYfY^{}BUWXf]WXhYb$ 

: U``g'8i 'Yg'j YfdUggh'\Ugh

.

fZ bWh]cbfXžgž]XŁoj Uf~gžZg·1 `X"[Yh9`Ya Ybhg6mHU[BUa YfgŁO\$Q/]ZfK"[Yh9`Ya Ybh6m=Xf]XŁŁfYhi fb/~g·1 `X"WfYUhY9`Ya YbhfgŁ/~g"]X·1 ]X/~g"gfWl~\hhdg.##\cbbYWh"ZUWYVcc\_"bYh#YbSI G#gX\_"~g, I ZVa `1 %/j Yfg]cb1j' "&~/Zg"dUfYbhBcXY"]bgYfh6YZcfYflgžZgŁ/qfXcWa YbhžfgWf]dhfzfZUWYVcc\_!~ggX\_flŁ/

8 YhU]`q

6Ygi WXYb G]Y i bg Ui Z \_fmdhc!bYk g"Uh