

%& K Y]\bUW\hg[YgW\Yb_Y ZØfFY]gYbXY

I bgYfY 'Â\f`]WX Y @JghY 'a]h '%& 'K Y]\bUWX hg[YgWX Yb_Yb 'ZØf FY]gYbXYžcV @YgYfUhhYbž: chc ZfYU_gž5XfYbU`]b 'I b_]Yg cXYf?i 'hi f`]YV\UVYf8]YgYg 'JU\f' k ØfXY 'XUg 'JU\f' gY]bž]b 'XYa 'XUg @YVYb 'k]YXYf'bcfa U`'k i fXY" 'GhUhhXYggYb 'VYZUbXYb 'k]f' i bg]b 'Y]bYa 'gY`hgUa Yb'; fYbnVYfY]WX 'VYgWXa i hnhYf'D`AbY' i bX < U`Vk YfhgnY]hYb" '9]b][Y'j Yfgi WX hYb 'hUdZYfž]\f' @YVYb ni fØW_ni YfcVYfb 'DYhYf'ni a '6Y]gd]Y`'gWX UZZhY'FY]gYb']b X]Y 'GWX k Y]nž'bUWX'; f]YWXYb`UbX'i bX NmdYfb 'UVYf'j]Y`YUbXYfY'j cb'i bg'j Yfk Y`_hYb']b 'X]YgYf'bYi Yb'FYU`]hAhž'k]Y6Ai a Yž'X]Y'j ca 'Ub\U`hYbXYb'K]bX'j YfnYffh'k i fXYb"'8]YgYf Ni ghUbX'XYf'@ gh`cg][_Y]h`\Uh'gc'j]Y`'j cb'i bgYfYf'NY]h [YgWX`i W_h'' K]Y 'X]Y 'a Y]ghYb'DUUfY'k YWX gY`b'g]WX'DYhYf'i bX]WX']b'i bgYfYb'Fc``Yb'/ Ua d\Y``]d/

I bgYfY'^À\f`]W\Y'@]ghY'a]h'%&'K Y]\bUW\hg[YgW\Yb_Yb'ZØf FY]gYbXYž'cV'@YgYfUhhYbž': chcZfYU_gž'5XfYbU`]b'\h_]Yg'cXYf ?i`hif`]YV\UVYf

8]YgYg'\\f`k\ØfXY'XUg'\\\f`gY]bž']b`XYa 'XUg'\@YVYb`k]YXYf
bcfa U``kifXY"'GhUhhXYggYb`VYZUbXYb`k]f'i bg']b'Y]bYa 'gY`hgUa Yb
; fYbnVYfY]W\`VYgW\aihnhYf'D`\AbY'i bX'<U`Vk YfhgnY]hYb"'9]b][Y
j Yfgi W\hYb'hUdZYfž']\f'\@YVYb'nif\ØW_niYfcVYfb' 'DYhYf'nia
6Y]gd]Y``gW\UZZhY'FY]gYb']b'X]Y'GW\kY]nž'bUW\'; f]YW\Yb`UbX'i bX
NmdYfb' 'UVYf'j]Y`Y'UbXYfY'j cb'i bg'j Yfk Y`_hYb']b'X]YgYf'bYi Yb
FYU`]h\Ah\z'k]Y'6\Aia Y\z'X]Y'j ca 'Ub\U`hYbXYb'K]bX'j YfnYffh
kifXYb"

8]YgYf'Ni ghUbX'XYf'@ gh`cg][_Y]h'\Uh'gc'j]Y`'jcb'i bgYfYf'NY]h
[YgW\`i W_h'''K]Y'X]Y'a Y]ghYb'DUUfY'k YW\gY`b'g]W\'DYhYf'i bX']W\
]b'i bgYfYb'Fc``Yb'XYg': fYi X`cgYb'i bX'XYg': fÒ\`]W\Yb'UV'''K Ybb
Yg']\a'gW\`YW\h'[Y\hž\YVY']W\']\b'\cW\'i bX'Yf'hi h'XUggY`VY'ZØf

a]WX "'8]YgYg'\$J\f'\UVYb'k]f'i bg'YXcWX'VY]XY'[`Y]WXnY]h][
ZfYi X`cg'[YZØ\`h"AY]bY'6Ya Ø\i b[Ybž']\b'XUj cb'ni 'ØVYfnYi [Ybž XUgg'Yf'_Y]b'kY]hYfYg'\$J\f'j YfgWXkYbXYh'\Uhž'i a 'gY]bYb
i `h]a Uh]j Yb'HfUi a 'ni 'j Yfk]f_`]WXYbž'k UfYb'VYghYbZU``g'n]Y``cgž
gWX`]a a ghYbZU``g'i bY\f`]WX"'\#b'K U\f\Y]h'\Uh'Yf'YbX`]WX\\$J\fY'Hcd!
:]hbYgg' 'i bX'nkY]'g]bX'[YfUXY'Ub']\a 'j cfVY][Y[Ub[Yb"

5i » YfXYa `\UVYb`k]f`VY]XY`Y]bY`nk Y]hY`7\UbWY`j YfdUgghž`]b`X]Y 5bhUf_h]g`ni `[Y\Yb`fi bgYfY`j cb`&\$&\$`Ui Z`&\$&%`j YfgW\cVYbY FY]gY`k i fXY`YfbYi h`j YfgW\cVYbŁ"`A Y\fYfY`_`Y]bYfY`FY]gYb k i fXYb`UV[YVfcW\Yb`i bX`a Y]b`bYi YghYf`Fca Ub`BYI h`cZ`?]b k i fXY`a]h`Y]bYf`_`Y]bYfYb`6i W\hci f`[YghUfhYh"

8]YgY`NY]h`\Uhii bg`j YfUb`UgghžY]b][Y`8]b[Y`bYi `ni `VYk YfhYbž Ub[YZUb[Yb`a]hii bgYfYa `I a ni [`]b`X]Y`Mcf_g\]fY`8U`Yg"`K]f\UVYb`i bgYfY`NY]h`\]Yf`gY\f`[YbcggYbž`UVYf`gc`k Y]h`k Y[`j cb :fYi bXYb`i bX`: Ua]`]Y`ni ``YVYbž`\Uhii bg`_`Uf`[Ya UW\hž`XUgg`k]f\]Yf`b]W\h`gY]b`k c``Yb"`K]f`[`Ui VYb`VY]XY`ZYgh`XUfUbž`XUgg`G]Y`\f\@YVYb`\AbXYfb`_\ObbYbž`k Ybb`Yg`\hovb)]W\h`[YZ\A``h"`\hovb)X\gYgYa G]bbY`\UVYb`k]f`i bgYf`<Ui g`9bXY`C_hcVYf`ni a `JYf_Ui ZUb[YVchYbž`]bbYf\U`V`Y]bYf`K cW\Y`Y]b`5b[YVchYUb[Ybca a Yb i bX`VYZ]bXYb`i bg`bi b`]b`Y]bYa `k Y]hYfYb`; fYbnni ghUbX.`K UfhYb Ui Z`XYb`5VgW\`i gg`XYg`JYf_Ui Zg"

 $< \emptyset VgWXY'KY] \ bUWXhg[YgWXYb_Y'ZØfFY]gYbXY$

%" 5 gd]b U`c Z'@c b X c b 'D Ugg\Ø``Y

5gd]bU``jcb`@bXcb`5gd]bU``cZ'@bXcb`DUgg\Ø``Y

9]b 'Y 'Y [UbhY f': fYi b X 'gU [hY 'a]f 'Y]ba U `ž 'X Ugg 'a Ub 'V]``] [Y ? 'Y]Xi b ['_Ui ZY b '_Ubbž'k Ybb 'a Ub 'g]Y 'a]h \ c W k Yfh] [Yb 5 \ WW ggc] f Yg '_ca V]b]Y fh 'G W i \ Yž 'H Ug W Yž'; ØfhY `ž '6 f]Y Zh Ug W Y " +b 5 b V Yh f U W h 'X Y gg Y b ']gh 'X] Y g Y 'D Ugg \ Ø ``Y 'j cb '5 gd] b U ``c Z @cb X cb Y]b Y ``c \ b Y b X Y '+b j Ygh]h]cb "

<UbX[YZYfh][h'Ui g'j c``bUfV][Ya '@YXYf'i bX'[YZØhhYfh'a]h
_cbhfUgh]YfYbXYa 'K]`X`YXYfž']gh'Yg'ghfUdUn]YfZÀ\]['[Ybi [ži a
FY]gYbXY'Ui Z''U\fY`Ub[Yb'5VYbhYi Yfb'ni 'VY[`Y]hYb"'+b'Y]bYf
9]bgWXi VhUgWXY'k YfXYb'6cfX_UfhYb'i bX'UbXYfY'I hYbg]`]Yb
Ui ZVYk U\fhž'k À\fYbX'XYf'DYfgcbU`]g]Yfi b[ggYfj]WY'Y]bY
Xi fWXXUWXhY'BchY'\]bni ZØ[h"'9g'[]Vh'Y]bY'FY]\Y'j cb': UfVYb'i bX
A UhYf]U`]Ybž'UVYf'a]h'X]YgYa '_`Ugg]gWXYb'Fch'i bX'6`Ui '_ÒbbYb
G]Y'b]WX hg'ZU`gWX'a UWXYb"</pre>

?Ui ZYb 'G]Y 'VY] '5gd]bU` 'c Z'@cbXcb

&"'J]bhU[Y!; `cVi g

: U]fY'Bi hni b['9]b'J]bhU[Y!; `cVi g']gh'a Y\f'U`g'bi f'Y]b XY_cfUh]j Yg'5WWggc]fY

DYhYf'_Ui ZhY'H\Y': fUb_`]b'5bh]ei Y'; `cVY'j cf'Y]b'dUUf'*J\fYb'ZØfgY]bYb'J UhYf'i bX'k]f'_Ui ZhYb'i bg'[`Y]W\'Y]bYbž'U`g'k]f']b'i bgYfbYi Yg'Ni \Ui gY'Y]bnc[Yb"

8 Yf; `cVi g`X]Ybh'U`g`XY_cfUh]j Yg`5 WW ggc]fY'i bX'U`g
6 Yni [gdi b_hž']gh'UVYf'Ui W\ Y]b hc``Yf'; YgdfÀW\gY]bgh]Y["'; ÀghY
_ca a Ybh]YfYb'cZh'Y]bY'ØVYffUgW\YbXY'9f_Ybbhb]gž'gY]'Yg'X]Y
HUhgUW\Yž'XUgg'XYf'DUn]Z]_'ZUgh'X]Y'<À`ZhY'XYf'9fXY'Y]bb]a a hž
cXYf'XUgg'Yg'bi f'Y]b'@UbX'nk]gW\Yb':]bb`UbX'i bX'BcfX_cfYU
[]Vh"'K Ybb'G]Y'b]W\h'Ui Z'FY]gYb'g]bXž']gh'Yg'bUhØf`]W\'XUg
BÀW\\ghVYghYž'XUj cb'ni 'hfÀi a Yb"

? Ui ZYb G]Y j cb GhUb ZcfXg

'"; fUj]YfhYf Gh]Zh i bX HU[YVi WX

 $5h`Ug' - 6cchg`8 Ug`a]h`DYhYfg` \pm]h]U`Yb`dYfgcbU`]g]YfhY`5a U`Z]!$

#W 'bY][Y 'XUni ž'a Y]bY 'B ch]nYb 'i bX '9f]bbYfi b[Yb 'X]fY_h']b 'a Y]b
HY 'Y Zcb 'Y]bni hfU[Ybž'UVYf'DYhYf'VYj cfni [h'Y]b 'd\mg]gWk Yg
HU[YVi Wk "'9f'fY]gh'a]h'Y]bYa 'k i bXYfgWk ÒbYbž'bUWk ZØ``VUfYb
a]hhY`[fc» Yb '5a U`Z]!@YXYf'ci fbU`ž'XUg'a]h'gY]bYb '♣b]h]U`Yb
dYfgcbU`]g]Yfh']ghž'i bX 'Y]bYa '< Ya]gd\YfY!: Ø``ZYXYf\U`hYf'j cb
K UhYfa Ub"</pre>

8]YgY'_`Ugg]gW\Yb'; YgW\Yb_Y'g]bX'dYfZY_h'ZØf'FY]gYbXYž'X]Y'j cbZYfbYb'@\AbXYfbž'\Ub[Yb', VYf\UbXfY]gYb'i bX'XYf'Fca Ubh]_'Y]bYf\Ab[gh'j Yf[Ub[YbYb'NY]h'hf\Ai a Yb"'f\GY]Yb'k]f'Y\f\]W\.'K]f'U\\Y_YbbYb'Y]bYb'XUj cb"\E

? Ui ZYb G]Y VY] DYb < YUj Yb

("GcbbYbi\fibX?cadUgg

DF '8 Ug 'd Y fZY_hY'; YgW\Yb_'ZØf'Ub[Y\YbXY'9bhXYW_Yf

9g'k]fX'a UbWa U`'[YgU[hž'XUgg'k]f'X]Y'a]hh`YfYb'?]bXYf'XYf; YgW]W\hY'g]bX' ini 'gdÀh'[YVcfYbž'i a 'X]Y'A YYfY'ni 'YfZcfgW\Ybž ni 'ZfØ\'[YVcfYbž'i a 'X]Y'GhYfbY'ni 'YfZcfgW\Yb"'A ÒW\hY[Yfb!9bhXYW_Yfž'X]Y'g]W\'bUW\Y]bYf'j Yf[Ub[YbYb'ŸfU'gY\bYbž'_ÒbbYbg]W\'a]h'X]YgYa 'a Uf_UbhYb'?ca dUgg'VY[bØ[Yb"

G]Y 'VYghY\h'Ui g'\cW. [`Ubndc`]YfhYa ž'[YVØfghYhYa 'A Ygg]b['i bX j YfZØ[h'ØVYf'Y]bY'Y]bn][Ufh][Y'GcbbYbi\fZ b_h]cb'i bX'Y]bYb'j c`` Zi b_h]cbgZÀ\][Yb'GYY_ca dUgg"'9g'k]fX'a]h'Y]bYf'GW\i hnhUgW\Y i bX'Y]bYa 'gYdUfUhYb'A Ygg]b[XYW_Y`'[Y`]YZYfhž'XYf'a]h'Y]bYf BUW\f]W\h'j cb'V]g'ni '-\$'NY]W\Yb'dYfgcbU`]g]Yfh'k YfXYb'_Ubb"

?Ui ZYb G]Y j cb *\sc\b @Yk]g

) "8Yf5hUgXYfGWXObY]h

 $8 \ Y \ f' \ 5 \ h' \ Ug' \ X \ Y \ f' \ GW\ Ob \ Y] \ h' \ K \ Y] \ b \ UW\ hg[\ Y \ gW\ Y \ b_Y' \ ZØ \ f' \ F \ Y] \ gY \ b \ X \ Y. \ '8 \ Y \ f' \ GW\ Ob \ Y] \ h$

A UbWka U`_ca a Yb`6ØWkYf`XU\Yf`i bX`a UWkYb`Y]bY`GU]gcb``Ub[:ifcfYž`i a `XUbb`Y]b`fi \][Yg`8UgY]b`ni `ZØ\fYbž`XYbb`bÀWkghYg \\\f`[]Vh`Yg`bYi Y`6ØWkYf`i bX`bYi Y`; YgWkYb_Y"`8Yf`5h`Ug`XYf GWk\Ob\Y]h'j YfX]Ybh`_Y]b`gc`WkYg`GWk]W_gU`"`9g`k i fXY`&\$%+`a]h j]Y``5i Za Yf_gUa _Y]h'j YfOZZYbh`]Wkh'i bX`]gh`\Yi hY`Y]b`YVYbgc dfÀWkh][Yg'; YgWkYb_"

8]Y?c``Y_h]cb`XYf`: chc[fUZ]b`A]\UY`U`BcfcWZY]Yfh`: fUi Yb`Ui g`) \$
@AbXYfb`Ui Z`XYf`[UbnYb`K Y`h'i bX`nY][hž`XUgg`GW\Ob\Y]h'ØVYfU``
]ghži bUV\Ab[]['j cb'; Y`Xž`F UggY`cXYf`gcn]U`Ya `GhUhi g"`9g`nY][h
: fUi Yb`]b`]\fYf`i fgdfØb[`]W\Yb`I a [YVi b[ž'j ca `5a UncbUg!
FY[Ybk U`X`V]g`ni `A Af_hYb`]b`\DX]Ybž`@cbXcbYf`GhfU»Yb`i bX`DUf_g
]b`<Uf`Ya ži bX`VYk Y]ghž`XUgg`GW\Ob\Y]h`]b`j YfgW\]YXYbYb
: cfa Yb`i bX`: UfVYb`_ca a h"

?Ui ZYb'G]Y'VY]'5a Uncb

 $DfU_h]gWXY'KY]\bUWXhg[YgWXYb_Y'ZØfFY]gYbXY$

*"Dck YfVUb_7 Gc`Uf`UXY[YfÀh

5h'Ug'/ '6cchg

DYhYf'j Yfk YbXYhY'XUg'Dck YfHfUj Y``Yf!?]h'Ui Z'5 WcbWU[i U

DYhYf'hfà[h'Ui Z'gY]bYb'j YfgWx]YXYbYb'K UbXYfi b[Yb'i bX 5bgh]Y[Yb'Y]bY'[UbnY'A Yb[Y'Y`Y_hfcb]gWxYf'; YfàhY'a]h'g]Wxž XUfi bhYf'nk Y]'? Ua YfUg'i bX'Y]b'Ga Ufhd\cbY"'5```X]Yg'VfUi Wxh GUZhžXU\Yf'a UWxYb'Y]bY'ni j Yf`àgg][Y'Dck YfVUb_'i bX'Y]b Gc`Uf`UXY[Yfàh'XUg'@YVYb'j]Y``Y]bZUWXYf"

: Øf`gY]bY`6YghY][ib[`XYg`5WcbWU[iU`]a 'j Yf[Ub[YbYb`\\fdUW_hY`Yf`Y]b`Dck Yf[cf]``U!@UXY[YfÀh'ibX`Y]b`ZU`hVUfYg Gc`Uf`UXY[YfÀh'ZØf`: U`Wcb`&%'jcb`Dck YfHfUjY``Yf`Y]b"

6Y]XY 'HY] 'Y 'XYg'?]hg'g]bX'gc'_cbn]d]Yfhž'XUgg'g]Y 'XYb'6Y 'Ughi b[Yb XYg'5i » YbY]bgUhnYg'ghUbX\U`hYb'i bX'Ui WX 'VY] 'YI hfYa '_U`hYb HYa dYfUhi fYb'Zi b_h]cb]YfYb"'8Yf'Dck Yf[cf]``U'_Ubb'; YfÀhY'a]h V]g'ni ', , 'K #&('J'fh"'6"'Y]bYb'@UdhcdŁ'Ui Z'UXYbž'k À\fYbX'XUg Gc`Uf`UXY[YfÀh') 'J!'i bX'&\$'J!; YfÀhY'k]Y'@Udhcdg'i bX'BYhVcc_g i bhYf'(\$'K ž'HUV`Yhgž'Ga Ufhd\cbYgž'; cDfcg'i bX'; DG!; YfÀhY Ui Z'UXYb'_Ubb"

?Ui ZYb G]Y VY] Dck YfhfUj Y Yf

+"'J YfdUW_i b[gk ØfZY`

 $9U[Y'7fYY_6U\bVfYWYbXYDUW_k \emptysetfZY)$

#W `\ UVY`Ui Z'a Y]bYf`FY]hfY]gY`bUW\`A cbhYbY[fc`Ub[YZUb[Ybž
J YfdUW_i b[gk ØfZY``ni 'j Yfk YbXYbž'i bX`Yg`k Uf`Y]bY`C ZZYbVUfi b["
9g`\Uh`X]Y`5fh`i bX`K Y]gYž`k]Y`]W\`dUW_Yž'j YfÀbXYfh`i bX`XUg
@YVYb`Ui Z'XYf`GhfU» Y`gc`j]Y``Y]bZUW\Yf`[Ya UW\h"`=\W`Z]bXY`a]W\\
b]W\h`a Y\f`XUVY]ž`Y]bY`gW\k UfnY`@Y[[]b[g`\YfUi gni n]Y\Ybž`k Ybb
]W\`k]f_`]W\`\]bhYf`a Y]bYf`gW\k UfnYb`Ghf]W_^U\W_Y`\Yf`V]bž`cXYf
bUW\`Y]bYf`Zf]gW\Yb`I bhYfk ÀgW\Y`ni `k Ø\`Yb"

? Ui ZYb 'G]Y 'j cb '9U[`Y '7fYY_

, "Ga Ufhk cc`!?ca Zcfh

K Ufa Y'?`Y]Xi b[']gh'i bg'k]Wkh]["'Jcb'6UgY`UmYfb'V]g'\]b'ni 8 Ui bYb'UW_Yb'`c\bh'Yg'g]Wkž']b'X]Y'f]Wkh][Y'5i gfØghi b['ZØf'X]Y f]Wkh][Y'I a [YVi b['ni ']bj Ygh]YfYb"'A Yf]bck c``Y'V]YhYh \Yfj cffU[YbXY'5ha i b[gU_h]j]hÀh'i bX': Yi Wkh][_Y]hghfUbgdcfhž k Ug'VYXYi hYhž'XUgg'g]Y']XYU``ZØf'6Ug]ggWk]WkhYb']gh"

Ga Ufhk cc``]gh'Y]bY'j cb'DYhYfg'@]YV`]b[ga Uf_Yb"'9f'j Yfk YbXYh Y]bY'J]Y`nU\``]\fYf'DfcXi _hYž'j cb'6UgY`UmYfb'i bX'H!G\]fhg'V]g'\]b ni 'I bhYfk ÀgW\Y'i bX'bUhØf`]W\'GcW_Yb^''Jcb'XYb'< Àb[Yb'XYg 5WcbWU[i U'V]g'ni 'XYb'DZUXYb'XYf'Mcf_g\]fY'8U'Yg'\UVYb'g]Y'Yg b]Y'j YfgÀi a hž']\b'k Ufa 'ni '\U`hYb"

?Ui ZYb'G]Y'VY]'Ga Ufhk cc`

- " K cf`X HfUj Y` 5 XUd hYf!?]h

Ga Ufhd\cbYgž'? Ua YfUgž'?]bX`Ygž'@Udhcdgž'9`Y_hfcfUg]YfYfž 9d]`]YfYf'i bX'i bnÀ\`][Y'UbXYfY'; YfÀhY'a ØggYb'i bhYfk Y[g Ui Z[Y`UXYb'k YfXYbž'gY]'Yg'ØVYf'XUg'Ghfca bYhn'cXYf'ØVYf'I G6"

 $8 \ \ Ug'7 \ Ydh] \ \ Wg'K \ \ cf`X'HfUj \ Y``5 \ X \ UdhYf'?]h']gh'X] Y'dYfZY_hY'@Ogi \ b['`ZØf \ X]Y'Yb]['Ybž'X]Y'gWXY]bVUf'i \ bYbX`]WX'j]Y`Y'? UVY``i \ bX'`5 \ X \ UdhYf \ Y]bdUW_Ybž'k Ybb'g]Y'i \ bhYfk Y[g'g]bX''$

8 Ugʻ5 XUdhYf!?]hʻZi b_h]cb]Yfhʻ]bʻØVYfʻ&\$\$ʻ@ÀbXYfbʻi bXʻHYff]hcf]YbibXʻ_UbbʻV]gʻni ʻZØbZ; YfÀhYʻa]hʻbi fʻY]bYfʻGhYW_XcgYʻUi ZʻUXYb"9gʻ]ghʻØVYfgdUbbi b[g[YgWXØhnhʻi bXʻj YfZØ[hʻØVYfʻnk Y]ʻI G!GhYW_Yfžʻnk Y]ʻI G6!5 bgWX`ØggYžʻY]bʻZYghYgʻI G6!?UVY`i bXʻgYWXg`AbXYfgdYn]Z]gWXYʻ5 bgWX`ØggY"

 $J Y fk Y b X Y b ``G] Y ``X Y b ``] b h Y fb U h] c b U `Y b ``5 X U d h Y f Z] b X Y f ``j c b ``7 Y d h] W g \check{z} i a ``X Y b ``5 X U d h Y f``ni ``Z] b X Y b \check{z} ``X Y f ``Ua ``V Y g h Y b ``ni ``=\ b Y b ``d U g g h ''$

 $? Ui ZYb G]Y VY]?Ydh]_Yfb$

%\$"'5f]U!GW\bcfW\Y`a Uq_Y

→W [Y\Y [YfbY gWk bcfWk Y`bža i gg UVYf ghÀbX]['a]h'Y]bYf
VYgWk `U[YbYb `A Ug_Y `\Yfi a gd]Y `Yb" '5`g]Wk ']b '8 gWk]Vi h] 'a]h
K U`\U]Yb 'gWk k Ua a ža i gghY ']Wk ']a a Yf 'k]YXYf 'Ui ZhUi Wk Ybži a
XUg 'K UggYf j cb 'a Y]bYf 'A Ug_Y 'ni 'YbhZYfbYbž k Ug 'VYXYi hYhYž
XUgg ']Wk 'k Yfhj c``Y 'A ca YbhY 'a]h'X]YgYb 'a U 'YghÀh]gWk Yb
?fYUhi fYb 'j Yfd UgghY" '8]Y '5f]U': i ``: UWW 'A Ug_'j cb 'C WW Ub 'F YYZ']gh
Y]b '; Ua Y!7\Ub[Yf"

A]h'dUhYbh]YfhYf'@ Zhn]f_i `Uh]cbghYW\bc`c[]Y'[UfUbh]Yfh'Yg'_Y]b
6YgW\`U[Yb"'9g'\Uh'Y]bYb'%, \$..!DUbcfUa UV`]W_ž'Yfa Ò[`]W\h
6Ybi hnYfb'XUg'5ha Yb'Xi fW\'X]Y'BUgY'i bX'j Yf\]bXYfh'XUg
9]bXf]b[Yb'j cb'K UggYf"'Ni a 'Ni VY\Òf'[Y\ÒfYb'Y]bY
?cffY_hi f`]bgYž'Y]bY'<U`hYfi b['ZØf'Y]bY'Gdcfh_Ua YfUž'Y]b'GY`Z]Y!
Gh]W_'i bX'Gbcf_]Y'HU`_]Yž'Y]bY'\deltabcj Uh]cbž'a]h'XYf'G]Y'VY]a
GW\bcfW\Y`b'_ca a i b]n]YfYb'_\ObbYb'

? Ui ZYb 'G]Y 'VY] 'C WY Ub 'F YYZ

%%" HfU[VUfYf K @5B!<i V

5`g`FY]gYgWkf]ZhghY``Yf`a UWkh`Yg`i bgYf`@YVYb`gc`j]Y``Y]bZUWkYfži bVY[fYbnhYg`[`cVU`Yg`K @5B`ni f`JYfZØ[i b['ni '\UVYbž'k Ybb a Ub`VYXYb_hž'k]Y`j]Y`Y`Ghi bXYb`k]f`XUa]h'jYfgWkkYbXYbž: cfhgWkf]hhgVU`_Yb`]b`Y]bYa `i bYfhfÀ[`]WkYb`HYa dc`ØVYf`Ub[gUaY`JYfV]bXi b[Yb`j cffØW_Yb`ni 'gY\Yb"

 $\label{eq:Karther} \text{K }] \text{f'} \backslash \text{UVYb'} \text{i} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[]YV]} [\text{ '[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[]YV]} [\text{ '[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[]YV]} [\text{ '[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[]YV]} [\text{ '[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[]YV]} [\text{ '[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{Ui } \text{g[Ybi } \text{hnh } \text{local} \text{ bgYfY'} \text{FY}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{cb'} \text{gYg}] \text{gYg}] \text{a } \text{i } \text{`Uh}] \text{cb'} \text{cb'} \text{gYg}] \text{a } \text{cb'} \text{cb'}$

?YYd[c'V]YhYh'Y]bY'FY]\Y'j YfgW\]YXYbYf'8 UhYbcdh]cbYb'ZØf'gY]bY hfU[VUfYb'K @5B!<chgdchg'i bX'K Y`h!G \Rightarrow 1?UfhYb"'K]f'j Yfk YbXYb XYb']bhYfbUh]cbU`Yb'K]Z]!<chgdch'j cb'?YYd[c \check{z} XUa]h'k]f'Ui Z FY]gYb'cb`]bY'[Y\Yb'_ObbYb"'8Ug'; YfÀh'[YbYf]Yfh'Y]bY'g]W\YfY K @5B!JYfV]bXi b['ØVYf'`c_U`Y'(; !A cV]`Zi b_bYhnY']b'ØVYf'\&\$ @AbXYfb"

%&" CgdfYml; YdÀW_

K Ybb Ygʻi a '; YdÀW_ [Y\hž`\Uh'DYhYf`U``Yg"'9f`\Uh HU[Ygfi W_gÀW_YžFi W_gÀW_Yž? Ua YfUhUgW\Ybž'GYYgÀW_Yž < UbX[YdÀW_ž'Fc``[YdÀW_'i bX'gc[Uf'Y]bY'FY]\Y'j cb'< mVf]XYb° BUW\XYa 'Yf''U\fY`Ub['j YfgW\]YXYbY'?]hVU[g'[YhYghYh'\Uhž gW\k Ofh'Yf'bi b'Ui Z'CqdfYm"

 $GY]b @YV`]b[gfi W_gUW_i]ghY]b CgdfYm'9I cg'', !Fi W_gUW_žXYf'bif _bUdd' @VYf'Y]b'?]`c[fUa a 'k]Y[h'''9g']gh'gi dYf`Y]Whž'[YfÀi a][ž ghfUdUn]YfZÀ\]['i bX'Y][bYh'g]W\'ZØf'X]Y'a Y]ghYb'7Ua d]b[!'i bX HfY__]b[hci fYbž'Y]bgW\`]Y\\`]W\'_@fnYfYf'K]`XWUa d]b[!'i bX K]bhYfVYf[ghY][Yfhci fYb'''9]bY'k Y]hYfY'[fc\\Ufh][Y'Cdh]cb']gh'XYf @Yj]hm'() ž'XYf'bi f', $$'['k]Y[hž'cVk c\``Yf'a Y\f'ZUggh'$

5h`Ug'/ '6cchg'DYhYfg'CgdfYm': Ufdc]bh'K \YY`g'' *

: Øf``Àb[YfY'9|dYX]h]cbYb'bi hnh'Yf'Y]bYb',)!@|hYf!
9|dYX]h]cbgfi W_gUW_'i bX'U`g'?cZZYf'\Uh'Yf'Y]bYb': Ufdc]bh'K\YY`g
'*'ZØf'<UbX[YdÀW_'i bX'Y]bYb'Fc``]b['HfUbgdcfhYf'K\YY`YX
8iZZY``*\$'ZØf'UiZ[Y[YVYbYq'; YdÀW_"

?]U'\Uh'Y]bYb'CgdfYm'HYa dYgh'Dfc'%, 'HU[Ygfi W_gUW_ž'XYf'Wcc' i bX'VYei Ya ']gh'i bX'[Ybi ['D`Uhn'ZØf'XUg'B Oh][ghY'V]YhYh''K Ybb Yg'i a '?cZZYf'[Y\h

Ghfi a dZZØ``Yf

 $8 \ Uf \emptyset VYf' \setminus]b \ Ui \ g'[] Vh'Yg'Y]bY'[UbnY'FY] \setminus Y'j \ cb'Ghfi \ a \ d ZZ\emptyset``Yfbž'X]Y \\ Z\emptyset f'U_h]j \ Y'FY]gYbXY'b \emptyset hn`]W 'g]b X''$

- 6]YhYb'G]Y'_Y]bY'DUdUmU'Ub.'Y]b'@Y]hZUXYb'ZØf' \Rightarrow fY'YfghY FY]gY'i a 'X]Y'K Y`h
- C\fghÒdgY`
- 5i [Yba Ug_Y
- : U`hVUfY NU\bVØfghY
- Gh]fb`Ua dY

$DYfgcbU^{}]g]YfYb^{}G]Y^{}=\ f^{}; YgWXYb_{}$

DUggYb'G]Y'YXYg'XYf'cVYb'[YbUbbhYb'K Y]\bUW\hg[YgW\Yb_Y'ZØf FY]gYbXY'a]h'[YghUbnhYb'5i Z_`YVYfb'j cb'Gh]W_YfMci'Ub"'8Yf VYbi hnYfZfYi bX`]W\Y'9X]hcf'Yfa $O[`]Wh'Ygž'aU * [YgWhy]XYfhY 5i Z_`YVYf'ZØf'YXYb'FY]gYbXYb'ni 'YfghY``Yb"'@UXYb'G]Y'$\Rightarrow f'YXYb'FY]gYbXYb'ni 'YfghY``Yb"'@UXYb'G]Y'$\Rightarrow f'YXYb'FY]gYbXYb'ni 'YfghY``Yb''G]Y'Ui g'XYf ?i bghV]V`]ch\Y_'Ui gž'i a '_`YVf][Y'; fUZ]_Yb'ni 'YfghY``Yb''9g'[]Vh Ui W\Cdh]cbYb'ni a '9fghY``Yb'j cb'5i Z_`YVYfb'a]h'FY]gYa ch]j Yb <math>ZØf'; YdAW_{Z}'?VYf'$

< Ui dhV]`X. G\i hhYfghc W_

6Ygi WXYb G]Y i bg Ui Z Y]bY!fY]gY "XY