

$F Ø W_Y \ f'bUWX' = bX]Yb'HY]^ = 8]Y$; YgWX]WXhY'aY]bYg'JUhYfg

a 'YfghYb'HY]`X]YgYf'nk Y]hY]`][Yb'GYf]Y'YfnÀ\`hY'DYhYf'gY]bY
; YgWk]Wk hY'j cb' ⊕X]Yb'Ui Z'XYf'Gi WkY'bUWk'XYb'`Àb[gh
j Yf`cfYbYb': fYi bXYb'gY]bYg'J UhYfg": ØbZ'≯J\fY'bUWk'gY]bYa
YfghYb'6Ygi Wk'_Y\fYb'J UhYf'i bX'Gc\b'bUWk' ⊕X]Yb'ni fØW_ž
i a 'g]Wk'a]h'X]YgYb': fYi bXYb'k]YXYf'ni 'hfYZZYb'''<]Yf']gh'X]Y
; YgWk]Wk hY'gY]bYg'J UhYfg"'8]YgYf'5fh]_Y``k i fXY'Ua''%("
: YVfi Uf'&\$%) 'Ui Z'XYf'K YVg]hY'XYg'A U[Un]bg'HfUj Y`Yf'j cb
BUh]cbU``; Yc[fUd\]Wj YfÒZZYbh`]Wkh'<Y]`][UVYbX'&\$%' "'9g
k Uf'BUWka]hhU['i bX'X]Y'GcbbY'VfUbbhY'i bg'k Ufa''Ui Z'XYb
FØW_Yb''K]f'ghUbXYb'Ui Z'XYf'8UWkj YfUbXU'i bX'V`]W_hYb'Ui Z
X]Y'ghUi V][Yb'GhfU» Yb'\]bi bhYf"'9]bY'gUbZhY'6f]gY'k Y\hYž
X]Y'_Ui a 'XUg'; Yk]ff'/ Ua d∧Y``]d/</pre>

 $8] YgYf^5fh]_Y^k i fXY^Ua^{-\infty} (":YVfi Uf^&$\%) ^Ui Z'XYf^K YVg]hY^XYg A U[Un]bg^HfUj Y^Yf^j cb^BUh]cbU^{+}; Yc[fUd^]Wj YfOZZYbh^]W h$

<Y]`][UVYbX`&\$%' "'9g`k Uf`BUW\a]hhU['i bX`X]Y`GcbbY`VfUbbhY
i bg`k Ufa 'Ui Z'XYb`FØW_Yb"`K]f`ghUbXYb`Ui Z'XYf`8UW\j YfUbXU
i bX`V`]W_hYb`Ui Z'X]Y`ghUi V][Yb`GhfU» Yb`\]bi bhYf"'9]bY`gUbZhY
6f]gY`k Y\hYž'X]Y`_Ui a 'XUg'; Yk]ff'j cb`Ghfca !'i bX`HY`YZcb_UVY`b
VYk Y[hYž'X]Y`nk]gW\Yb`XYb`< Ài gYfb`]b`X]YgYa 'fY`Uh]j
k c\`\UVYbXYb`J cfcfh'j cb`6\]`k UfUž'FU'Ugh\Ubž'XfUd]Yfh'k UfYb"</pre>

 $\times XYg' < Ui g'k i fXY']b'j YfgWX]YXYbYb'DUghY``hÒbYb'j cb'6`Ui ž'; fØb$

i bX`DZ]fg]W\`[Yghf]W\Yb`i bX`j cf`Y]bYb`Uni fV`Ui Yb`<]a a Y` [YghY``h"`9g`k Uf`fi \][`i bX`X]Y`GhfU»Yb`k UfYb`ZUgh``YYf"

 $8]Yg^kUf^]b^XYf^HUh^ØVYffUgWXYbXž^XU^X]Yg^{\pm}X]Yb^kUf^{*}$

⇒W. "ghUbX'VY] "XYb' ≈g\]!6fØXYfb "GUhmbUfU]b'i bX'F UX\Yg\mUa 'i bX'VY] a Y]bYa "Gc\b'DYhYfž'XYf'gc'a U»[YV`]W\ "XUni "VY][YhfU[Yb\UhhYž'XUgg']W\ 'ni fØW_[]b['i bX'X]YgY'VY]XYb'U`hYb': fYi bXY']b 6\]`k UfU'Ui Zgi W\hY"

9g'k Uf'Y]bY'i b[`Ui V`]W\Y'NY]hz'X]Y'a]W\n}YZ'[Ydf\[h'\Uh''9g [Y`Ub['a]fz'`Ub[Y'NY]h'a]h'FUX\Yg\mUa 'ni '_cffYgdcbX]YfYbz' UVYf'gW\]\]Y\[Y\]Yf[]b['X]YgY'i bX'k]f'j Yf`cfYb'XYb'?cbhU_h'' 8Ubbz'j cf'Z\[ØbZ'\]\fYbz'VYgW\`cgg'a Y]b'Gc\b'DYhYfz'bUW\XYa 'Yf gc'j]Y`Y'a Y]bYf'; YgW\]W\hYb'[Y\\Ofh'\UhhYz'X]Y'a]h' K\Yb'=k Ug]b'\D\X]U 'VY[cbbYb'\UhhYbz'i bX'VYfY]hg'gY`Vgh'j ca 'FY]gYZ]YVYf Ub[YghYW_h'k cfXYb'k Ufz'bUW\\D\X\]Yb'ni '[Y\Yb'i bX'ni 'gY\Ybz'cV Yf'g]Y'Ui Zgd\[ØfYb'_\ObbhY'aY]bY'\Ub[Y'j Yf`cfYbYb': fYi bXY'''9g'k Uf Y]b'`Ub[Yf'K Y[z'UVYf'8]b[Y'dUgg]YfYb'Ui Z'XYf'GhfU\"Y'''9f'Yf\]Y`h X]Y'[`Y]W\Y'5fh'j cb'K]``_ca a Ybz'X]Y']W\'Yf\U`hYb'\UhhY''

'U`h1 2 K]YXYfgY\Yb'a]h'XYa 'U`hYb': fYi bX'GUhmUbUfUmUb'≈g\]ž &\$%'

5`gcž'k Ugʻ]gh'a]h'X]YgYa '⇒X]Yb3'8]YgYgʻ@UbXž'UbʻXUgʻ]W\ 'a]W\ j cf'gc'`Ub[Yf'NY]h'Yf]bbYfhY"'8]YgYgʻ@UbX'XYfʻ]bhYbg]j Yb': UfVYb" Gc'Y]b'@]W\h"'8Ug'YbX`cgY'6`Ui 'XYg'<]a a Y`g'i bX'XYf'VfUi bY GhUi VžXYf'ØVYfU``ni gY]b gW]Yb"5i ZXYb A Àf_hYbž]b XYf'@ Zh gW k Yf'b UW; Yk ØfnYbž\c_hYb': fUi Yb a]h'< Ui h'k]Y @YXYfž g]`VYfbYb'5fa fY]ZYb i bX g]`VYfbYb'< U`g_YhhYbž`Yi Wk hYbX'fchYb i bX'V`Ui Yb hfUX]h]cbY``Yb F Ò_Yb'i bX'6`i gYb a]h'?cd\ZhØ\\YfbŽ X]Y XYf'5bghUbX'\U`VYf'ØVYf'XUg'; Yg]\\k'h'[Ync[Yb'k UfYbž i a [YVYb'j cb'?ÒfVYb'ØVYfZØ``h'a]h'; Ya ØgYž'dc`]YfhYb'[fØbYb DUdf]_Ug\\k'chYb'i bX'cfUb[YZUfVYbYb'F]b[Y`V`i a Yb"'8Yf'\@Àfa i bX'X]Y'gh\AbX][Y'<Y_h]_"'Jc``[Yghcd\ZhY'6i ggY"'\\\\fY'HUI]g'g]bX [Yg\\k'a \Ø_h' 'Y]b'[fY``Yf'G\\k'Y]b'Z\Øf'Y]bY'\]bXi]gh]g\\k'; chh\Y]h'' fc\\Yg\\k'k UfnY'8 Ua d\Zn\Ø[Y'XcbbYfb'\ØVYf'hfc_YbYz'[Y\VY 9VYbYb'nk]g\\k'Yb'FY]\Yb'g\\k']a a Yfb\XYf'j]c`YhhYf'<\Ø[Y`\Z'X]Y'Y\Yf k]Y'Y]bY'GnYbY'Ui g'Y]bYa 'U`hYb'K YghYfbZ\`a 'Ui qqY\Yb''

I bX']a a Yf'X]Y'YfVUfa i b[g`cgY'<]hnY"'GW\bY``'j cb'XYf'GW\i `Y bUW\'<Ui gY'fUXY`b'i bX'V]g'ni a '5VYbX']b'X]Y'_U`hY'8i gW\Y ghY``Ybž'VYj cf'XUg'K UggYf'UV[YghY``h'k]fX"'GYhnYb'G]Y'g]W\'j cf XYb'9`Y_hfcj Ybh]`Uhcf' 'U\ž'XYf'Ghfca ']gh'gW\cb'k]YXYf Ui g[YZU``Yb"'K UfhYb'G]Y'Ui Z'XYb'5VYbXž'k Ybb'X]Y'DZUi Yb'fi ZYbž k Ybb'X]Y'GcbbY'gW\bY``i bhYf[Y\h'i bX'X]Y'BUW\h'X]W_'i bX'X]Y GhYfbY'gc'bU\'q]bX"

l b X 'X]Y '@Y i hY "

I bX'X]Y'GW\i`_]bXYfž'hUXY``cg'[Y_`Y]XYh']b'V`]hnV`Ub_Yž'gUi VYfY
I b]Zcfa Ybž'X]Y'j cf'XYf': U\bY'ZØf'X]Y'A cf[Ybj YfgUa a `i b[
GW\`Ub[Y'ghUbXYb"'8]YgY'ZUbX']a a Yf']b'XYf'?Ø\`Y'XYg'A cf[Ybg
Ui Z'XYa '8 UW\'ghUhh'i bX'k Uf'Y]bY'gY\f'Yfbgh\UZhY'5b[Y`Y[Yb\Y]h"
<]Yf'k Uf'CfXbi b['i bX'JYfV]bX`]W_Y]h"

8 Yf @Àfa ž X Ug 8 f Ua U i b X X Ug ghÀb X][Y 'HfY] V Y b 'Ui Z 'X Y b 'j c b H W X U]! GhÀb X Y b '[YgÀi a h Y b '< Ui d hghf U » Y b " ? Ø\ Y ž X] Y 'Zf] Y X `] W `Ui Z X Y f 'Ghf U » Y 'ghY\ Y b 'i b X 'X Y g] b h Y f Y gg] Y f h 'ni g W X Ui Y b " G W k Y] b Y ž 'X] Y b U W X '5 V Z U `` 'g W X b Ø Z Z Y `b " F c ha] `Ub Y '_ f Y] g Y b 'Ø V Y f '] \ b Y b 'i b X [Y `Y [Y b h`] W X 'a Ufg W] Y f h 'Y] b 'g U Z f Ub Z U f V Y b '[Y _ `Y] X Y h Y f `\ Y] `] [Y f A Ub b 'a] h 'Ui g [Y g h f Y W_h Y f ' < Ub X 'j c b '; Y g W À Z h 'ni '; Y g W À Z h "

 $A i g]_{Ui} g : XYa b Yi YghYb <]bX]!:]`a ``]YZ'Xi fWX `X]Y `GhfU* Yb Z'k Y\hYXi fWX `X]Y `: YbghYf`\YfY]b `i b X `k UfV `ZØf`]f[Yb XYhk Ug" I b X b UhØf`]WX `X]Y `5 fa i h" `A YbgWX Yb Z'X]Y `b]WX hg `Ui * Yf `XYa `\UVYb Z'k Ug g]Y `]b `XYb `5 fa Yb `\U`hYb" I b X `Yg`[]Vh `gc 'j]Y`Y" `?Y]b G]WX Yf\Y]hgbYhn `\]Yf" `?Y]bY'; UfUbh]Yb `ZØf`a cf[Yb"$

 $5VYf^*XYbbcW^*gW^*Y]bh^*Yg^*Y]bYb^*Cdh]a]gaig^ni^[YVYbž^*Yhk Ug < cZZbib[^gc[Uf^*Ub[Yg]W^*hg^*iba Ò[^]W^*Yf^*K]Xf][_Y]hYb"$

5VYf`XUg`]gh`U``Yg`[YgdY]WXYfhY`9f]bbYfi b[```Y]b`?U`Y]Xcg_cd
`YV\UZhYf`FØW_V`YbXYb"`K]Y`_Ubb`]WX`X]YgY`; YXUb_Yb`i bX
9a ch]cbYb`UV`Y[Yb`i bX`cfXbYb3`I bX`k]Y`k Uf`Ygž`ni fØW_`ni
[Y\Yb3`K i bXYfVUf"`8Ug`; `Y]WXY3`\Jž`XUg`; `Y]WXY"`?Y]b
I bhYfgWX]YX"`A Y\f`@Yi hY"`, VYfZØ``hYf"`A Y\f`JYf_Y\f"`5VYf`XUg
[`Y]WXY"

K]Y ']a a Yf'j c``Yf'K]XYfgdfØW\Y'i bX'gc'j Yfk]ffYbX'k]Y 'XUa U`gž U`g']W\ 'Xcfh'k Uf" '5VYf'a Ub'_Ubb' \D\X]Yb'b]Ya U`g'[`Y]W\ [Ø`h]['gY]b" 9g'gW\Y]bh']a a Yf'Y]bY'FYU_h]cb'\Yfj cfni fi ZYb'i bX'cZh [Y[YbgÀhn`]W\Y'i bX'X]Ua YhfU`'Ybh[Y[Yb[YgYhnhY'FYU_h]cbYbž'X]Y g]W\ ']bbYf\U`V'k Yb][Yf'A]bi hYb'AbXYfb'_ObbYb"

#W 'k Uf'i fgdfØb[`]WW 'a]h'XYa '; YXUb_Yb'Ub[Y_ca a YbžXUgg']WW
\Y`ZYb'k ØfXYžYhk Ug'ni 'ÀbXYfbž'i a 'X]Y'8]b[Y'ni 'j YfVYggYfb"
8 c WW 'U``ni 'gWW bY```Yf_Ybbh'a Ub'X]Y'K Y]hY'Y]bYf'gc`WW Yb'=XYY'i bX
gc[Uf'XYf'9]bV]`Xi b["'8 Ug'k]fX'XUbb'Xi fWW 'X]Y': fU[Y'YfgYhnhž'bU'
'Už'k Ug'[YbUi 'k]```]WW 'ÀbXYfb3'; Ubn'_`Ufž'i a 'XYb
@YVYbgghUbXUfX'j]Y`Yf'ni 'Yf\Ò\Yb'i bX'Ui Z'X]Y'JYff]b[Yfi b['XYf
5fa i h'\]bni UfVY]hYb"'5VYf'[Y\h'XUg'<UbX']b'<UbX'a]h'XYa
a dcfh'j cb'A UhYf]U`]ga i gž' ₺Xi ghf]U`]g]Yfi b['i bX
La k Y`hj YfgWXa i hni b[3'; Yk]ggž']WX \\UVY'j]Y`'a Y\f'VY_ca a Ybž</pre>

U`g']W\'[Y[YVYb'\UVY"

5a '9bXY'ghUbX']W\'Ui Z'XYa '8 UW\']b'XYf'GcbbY'i bX'ZfU[hY'a]W\Z k c'U``'X]Y'\J\fY'[YV`]YVYb'k UfYb"'K]Y'`\Y]W\h'k UfYb'g]Y j cfVY][YgW\`ØdZh"'5`g']W\'Xcfh'ghUbX\Z'gd\ØfhY']W\\Z'k]Y'FUX\Yg\mUa a Y]bY'<UbX'bU\a 'i bX'g]Y'gUbZh'Xf\Ø_hY'''9f'gW\]Yb'a Y]bY JYfk]ffi b['ni 'j YfghY\Yb'i bX'Yg'k Uf\Z'U`g'k \AfY']W\'b]Y'[Y[Ub[Yb"

9g'\Uh'a]W\'bUhØf`]W\']a a Yf'bcW\'a]h'a Y\f': fU[Yb'U`g 5bhk cfhYb'ni $fØW_[Y`UggYb"$

#W\ 'V]b 'a Y]bYa 'Gc\b'k Y]hYf\]b 'gY\f'XUb_VUf'ZØf'gY]bY
9fa i h][i b['ni f'FØW__Y\fž'gY]bY'I bhYfghØhni b[ž'gY]b ' ±bhYfYggY
i bX'gY]bY'@]YVY"

@Y]hV]`X.~5h`Ug~/~6cchg

8 YhU1`a

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