

; fY]n'YbhXYW_Yb.'5`hghUXhž'?i`]bUf]_'i bX i bj Yf[Ygg`]WXY'9f`YVb]ggY

9bhXYW_Yb^G]Y^; fY]n. 'j cb^XYf^a U`Yf]gW\Yb^5`hghUXh^ØVYf fY[]cbU`Y^GdYn]U`]hÀhYb^V]g^\]b^ni ^\]ghcf]gW\Yb^GW\ÀhnYb i bX^_i `hi fY``Yb^J YfUbghU`hi b[Yb"^9]b^i bj Yf[Ygg`]W\Yf 5i ZYbh\U`h^k UfhYh°



K]`_ca a Yb']b'; fY]nžY]bYf'W\Ufa UbhYb'GhUXh']a '<YfnYb 8Yi hgW\'UbXgžX]Y'cZh']a 'GW\UhhYb']\fYf'VY_UbbhYfYb'BUW\VUfb ghY\h''K À\fYbX'; fY]n'Y]bY'fi\][Y'5ha cgd\ÀfY'Ui gghfU\'hž'\Uh'g]Y XcW\'j]Y`ni 'V]YhYb' 'j cb'XYf'a U`Yf]gW\Yb'5`hghUXh'a]h']\fYb j Yfk]b_Y`hYb'; UggYb'V]g'\]b'ni '_i `]bUf]gW\Yb'? Ògh`]W_Y]hYbžX]Y X]Y'; YgW\a UW_g_bcgdYb'j Yfk Ò\bYb'''<]Yf'_UbbghXi 'X]Y GW\`Ob\Y]h'XYf'BUhi f'Yf`YVYbžgY]'Yg'VY]a 'K UbXYfb'cXYf FUXZU\fYb']b'XYf'I a [YVi b[ži bX'X]Y'VYY]bXfi W_YbXY; YgW\]W\hY'XYf'FY[]cb']b']\fYb'GW\`ÒggYfb'i bX'A i gYYb YbhXYW_Yb''8 Ug'_i `hi fY``Y'@YVYb']b'; fY]n']gh'`YV\UZh'i bX j]Y'ZÀ`h][ža]h'JYfUbghU`hi b[Yb'i bX': YghYbž'X]Y'XUg'[UbnY'\\J\f

k]f'Y]b][Y'; Y\Y]a h]ddg'ZØf'X]W\ž'X]Y'XY]bYb'5i ZYbh\U`h i bj Yf[Ygg`]W\'a UW\Yb'k YfXYb"'5`gc'gW\bUdd'X]f'XY]bYb FY]gYZØ\fYf'i bX'`Ugg'i bg'[Ya Y]bgUa 'Ui Z'9bhXYW_i b[gfY]gY Xi fW\'; fY]n'[Y\Yb°

9bhXYW_i b[gfY]gY`Xi fWX`X]Y`a U`Yf]gWXY 5`hghUXh`j cb`; fY]n

 $8]Y : 5 `hghUXh'j cb'; fY]nž'Y]b[YVYhhYh']b'X]Y'gUbZhYb'<\emptyset[Y``XYg Jc[h`UbXgž']gh'Y]b'k U\fYg'$\delta k Y`ž'XUg'XUfUi Z'k UfhYhž'YbhXYW_h'ni k YfXYb''A]h']\fYf'W\Ufa UbhYb'5fW\]hY_hi fž'XYb'j Yfk]b_Y`hYb; UggYb'i bX'XYf'ZUgn]b]YfYbXYb'; YgW\]W\hY'V]YhYh'; fY]n'Y]bYUha cgd\\Af]gW\Y'?i `]ggY'Z\Øf'U``Yž'X]Y'XUg'6YgcbXYfY'gi W\Yb''<]Yf_Ubb'a Ub'b]W\h'bi f'X]Y'JYf[Ub[Yb\Y]h'gd\ØfYbž'gcbXYfb'Ui W\X]Y_i `hi fY``Y'J]Y`ZU`h'X]YgYf'FY[]cb'Yf`YVYb''$

9]b dYfZY_hYf GhUfh ZØf = fY '9bhXYW_i b[gfY]gY ']gh XYf A Uf_hd `Uhn"

I a [YVYb j cb \]ghcf]gWXYb; YVÀi XYbžghfU\`h X]YgYf nYbhfU`Y

Di b_h XYf 5 `hghUXh Y]b`UXYbXY; Ya Øh`]WX_Y]h Ui g" GWX `YbXYfb G]Y

Xi fWX 'X]Y 'Y]b`UXYbXYb '6ci h]ei Yb ii bX '7 UZÅgž X]Y 'g]WX 'Ybh`Ub['XYg

D`UhnYg 'fY]\Ybž ii bX '[Yb]Y» Yb 'G]Y 'X]Y 'nY]h`cgY '5ha cgd\ÀfY" '8Yf

F Uh\ Ui gVfi bbYbž Y]b 'VY`]YVhYf 'HfYZZdi b_hž ']gh j cb 'hY]`g

VUfc W_Yb ii bX 'hY]`g'_`Ugg]n]gh]gWXYb ; YVÀi XYb ii a [YVYbž X]Y 'Y]bY

WX Ufa UbhY '?i`]ggY 'V]YhYb"

9]b k Y]hYfYg'<][\`][\h'XYf'5`hghUXh']gh'XUg'GWX`cgg'; fY]nž'XUg a UYghÀh]gWX Ui Z'Y]bYa '< \emptyset [Y`'h\fcbh'i bX'Y]bYb UhYa VYfUi VYbXYb'6`]W_' \emptyset VYf'X]Y'GhUXh'V]YhYh'''9g'k i fXY']a '%, "\$\J\f\i bXYfh'YfVUi h'i bX'VY\YfVYf[h'\Yi hY'Y]b'A i gYi a ž'XUg'X]Y; YgWX]WXhY'i bX'?i `hi f'XYf'FY[]cb'dfÀgYbh]Yfh''8]Y'dfÀWXh][Y

GWX`cggUb`U[Y`a]h']\fYb'HYffUggYb'i bX'; ÀfhYb'`ÀXh'ni a JYfkY]`Yb'Y]b'i bX']gh'Y]b'VY`]YVhYg': chca ch]j "

9]b'GdUn]Yf[Ub['Ybh'Ub['XYf'9`ghYfžX]Y'Xi fW\'X]Y'5`hghUXh'Z]Y» hž
]gh'b]W\h'bi f'YbhgdUbbYbXž'gcbXYfb'Ui W\'Y]bY'; Y`Y[Yb\Y]hž'X]Y
]Xm``]gW\Y'BUhi f'fi bX'i a '; fY]n'ni 'VYk i bXYfb"'9bh'Ub['XYg
:`i ggYg'Z]bXYb'g]W\'nU\`fY]W\Y'\]ghcf]gW\Y'6fØW_Ybž'X]Y'Y]bYb
a U`Yf]gW\Yb'6`]W_'Ui Z'X]Y'GhUXh'V]YhYb"'8]Y'5ha cgd\ÀfY'\]Yf']gh
VYgcbXYfg'Zf]YX`]W\'i bX'Y][bYh'g]W\'\Yfj cffU[YbX'ZØf'Y]b'D]W_b]W_
cXYf'i a 'Y]bZUW\'bi f'X]Y'GYY`Y'VUi a Y`b'ni '`UggYb"

: $\emptyset f$; $Y g W W hg h Y f Y g g Y f h Y v Y h Y h Y h Y g W X Y f 6 Y g i W X Y g G h U X h a i g Y i a g ; f Y] n U b Z X U g] b Y] b Y a U h Y b : U V f] _ [Y V Å i X Y i b h Y f [Y V f U W h] g h i b X] b h Y f Y g g U b h Y 5 i g g h Y ``i b [Y b 'n i f '; Y g W] W h Y X Y f G h U X h i b X] \ f Y f 6 Y k c \ b Y f 'n Y] [h'' <] Y f _ U b b 'a U b 'j] Y ` <math>\emptyset$ V Y f X] Y Y] b g h] [Y '6 Y X Y i h i b ['; f Y] n 'U 'g 'N Y b h f i a 'X Y f 'H Y I h] `] b X i g h f] Y Y f Z U \ f Y b 'i b X 'X] Y '9 b h k] W `i b ['X Y f G h U X h X i f W 'j Y f g W] Y X Y b Y 9 d c W Y b 'b U W j Y f Z c ` [Y b "

K Ybb'G]Y'Y]b'k Yb]['a Y\f'NY]h'\UVYbž'gc``hYb'G]Y'X]Y'; fY]nYf
DUf_Ub`U[Yb'VYgi W\Ybž'X]Y'g]W\']b'XYf'BÀ\Y'XYg'GW\`cggYg
VYZ]bXYb"'8]YgY'k Y]h`Ài Z][Yb'; ÀfhYb'g]bX']XYU``ZØf'Ui g[YXY\bhY
GdUn]Yf[Àb[Y'cXYf'i a 'Y]bZUW\XX]Y'GW\Òb\Y]h'XYf'BUhi f'ni
[Yb]Y»Yb"'A]h']\fYb'U`hYb'6Ài a Ybž'gh]`j c``Yb'GdUn]Yfk Y[Yb'i bX
j YfghYW_hYb'K]b_Y`b'g]bX'g]Y'Y]b'dYfZY_hYf'FØW_ni [gcfh"

GY\Ybgk ØfX][_Y]h	6YgWXfY]Vi b[
A Uf_hd`Uhn	NYbhfU`Yf'Di b_h'XYf'5`hghUXh	
	a]h'\]ghcf]gW\Yb'; YVÀi XYb'i bX	
	7 UZÅg"	
9j Ub[Y`]gWXY'GhUXh_]fWXY'Gh"	<]ghcf]gW\\ Y '?]fW\\ Y 'a]h	
5 ZfU	VYY]bXfi W_YbXYf	
	±abYbUigghUhhib["	
GWX`cgg'; fY]n	AUYghÀh]gWXYg'GWX`cgg'a]h	
	AigYia ibX gWX ObYb	
	; UfhYbUb`U[Yb"	
GhUXhaigYia; fY]n	9fZU\fha Y\f\ØVYf\X]Y	
	; YgWX]WXhY`XYf`GhUXh`i bX`]\fY	

GY\Ybgk ØfX][_Y]h	6YgWxfY]Vib[
	⇒Xi ghf]Y"
; fY]nYf`DUf_Ub`U[Yb	⇒Xm``]gWkY'; ÀfhYb'ZØf
	YbhgdUbbhY GdUn]Yf[Àb[Y]b
	XYf BUhi f"

Ni gUa a Yb[YZUggh'V]YhYh'X]Y'5`hghUXh'j cb'; fY]n'b]W\h'bi f'Y]bY
: Ø``Y'Ub'\]ghcf]gW\Yb'GY\Ybgk ØfX][_Y]hYbž'gcbXYfb'Ui W\'Y]bY
`YVYbX][Y'5ha cgd\ÀfYž'X]Y'ni a 'JYfk Y]`Yb'i bX'9bhXYW_Yb
Y]b`ÀXh'''CV'VY]'Y]bYa '6i a a Y``Xi fW\'X]Y'Yb[Yb'; UggYb'cXYf
VY]a '6Ygi W\'XYf'_i `hi fY``Yb'<][\`][\hg''; fY]n']gh'Y]b'Cfh'j c``Yf
; YgW\]W\hYbž'HfUX]h]cbYb'i bX'ØVYffUgW\YbXYf'9bhXYW_i b[Ybž
XYf'G]Y'g]W\Yf`]W\'j YfnUi VYfb'k]fX"

?i`]bUf]gWXY'< \dot{O} Ydib_hY.'GdYn]U`]hÀhYb'XYf FY[]cb'; fY]n

; $fY]n\check{z}'Y]bY'W$, $Ufa UbhY'GhUXh']b'H\Øf]b[Yb\check{z}']gh'b]W$, h'bi f'Y]b'Cfh $XYf'\]ghcf]gW$, $Yb'GY\Ybgk\@fX][_Y]hYb\check{z}'gcbXYfb'Ui\W'Y]b'k\U\fYg$ DUfUX]Yg'Z@f': Y]bgW, $a YW_Yf''8]Y'_i']bUf]gW$, $Yb'6YgcbXYf\Y]hYb$ $XYf'FY[]cb'g]bX'j]Y'ZA'h]['i bX'gd]Y[Y'b'X]Y'fY]W, Y'HfUX]h]cb'i bX <math>XYb'9]bZi\ gg'j\ cb'Ni\ hUhYb'Ui\ g'XYf'I\ a\ [YVi\ b['k]XYf'''<]Yf'g]bX Y]b][Y'XYf'_Ògh']W, Yb'GdYn]U']hAhYb\check{z}'X]Y'G]Y'VY]'=\ fYa '6Ygi W']b ; <math>fY]n'i\ bVYX]b[h'dfcV]YfYb'gc'`hYb''$

$H\ \emptyset f]b[Yf\ 6fUhk\ i\ fgh$

; fY]nYf'? `O`» Y

9]b'k Y]hYfYg'UVgc'i hYg'A i gg'g]bX'X]Y'; fY]nYf'? `Ò» Y"'8]YgY? Ufhc ZZY`_`Ò» Y'g]bX'VY_Ubbh'ZØf']\fY'VYgcbXYfY
Ni VYfY]hi b[gk Y]gY'i bX']\fY'Zi ZZ][Y'HYI hi f"'G]Y'k YfXYb'c Zh'a]h
Y]bYa '_Ògh`]W\Yb'6fUhYb'gYfj]Yfhž'gY]'Yg'F]bX'c XYf'GW\k Y]bž'i bX
g]bX'Y]bY'dYfZY_hY'9f[Àbni b['ni 'j]Y`Yb'hfUX]h]cbY``Yb'; Yf]W\hYb"
DfcV]YfYb'G]Y'X]Y'? `Ò» Y']b'Y]bYa 'XYf'À`hYghYb'FYghUi fUbhg'XYf
GhUXhž'i a 'X]Y'Ui h\Ybh]gW\Yb'5fca Yb'ni 'Yf`YVYb"

FY[]cbU`Yf'? ÀgY

8]Y'FY[]cb'i a '; fY]n'\Uh'Ui W\'Y]bY'fY]W\Y'?ÀgY_i `hi f"'
H\Øf]b[Yf'?ÀgY'k]fX'Ui g'Zf]gW\Yf'A]`W\'k]`XYf'?Ø\Y'\Yf[YghY``h
i bX'k Y]gh'Y]bY'J]Y`ZU`h'Ub'; YgW\a UW_gf]W\hi b[Yb'Ui Z''Jcb
a]`XYb'V]g'\]b'ni '_fÀZh][Yb'GcfhYb'[]Vh'Yg'ZØf'YXYb
?ÀgY`]YV\UVYf'Yhk Ug'ni 'YbhXYW_Yb"'6Ygi W\Yb'G]Y'`c_U`Y'A Àf_hY
cXYf'?ÀgYfY]Ybži a 'X]YgY'@YW_YfY]Yb'ni '_cghYb'i bX'X]Y
\cW\kYfh][Yb'\UbX[YZYfh][hYb'DfcXi_hY'ni 'i bhYfghØhnYb"

$H\setminus \emptyset f]b[YfG\emptyset \otimes gdY]gYb$

K UbXYfb i bX GWX `Ya a Yb. FY[]cbU`Y ; Ybi gg! Fci hYb

9]bY'\Yfj cffU[YbXY'A Ò[`]W_Y]hž'X]Y'?i`]bUf]_'XYf'FY[]cb'ni Yf`YVYbž']gh'XUg'K UbXYfb'Ui Z'XYb'k Y]h'Ài Z][Yb'K UbXYfk Y[Ybž X]Y'j cb'; fY]n'Ui g[Y\Yb''?ca V]bUh]cbYb'Ui g'K UbXYfi b[Yb i bX'_i`]bUf]gW\Yb'9bhXYW_i b[Yb'k YfXYb'cZh'cf[Ub]g]Yfh''5i Z X]YgYb'Hci fYb'\UVYb'G]Y'b]W\h'bi f'X]Y'; Y'Y[Yb\Y]hž'X]Y

FY[]cbU`Y; YhfÀb_Y

8]Y'_i`]bUf]gWXYFY]gY'k ÀfY'b]WXh'j c``ghÀbX]['c\bY'X]Y
dUggYbXYb'; YhfÀb_Y"8Ug'H\Øf]b[Yf'6]Yf']gh'VY_Ubbh'ZØf'gY]bY
\c\Y'EiU']hÀh'i bX'JUf]YhÀh"9]b][Y'6fUi YfY]Yb']b'XYf'I a [YVi b[V]YhYb': Ø\fi b[Yb'Ubž'VY]'XYbYb'G]Y'X]Y'?i bgh'XYg'6fUi Ybg
_YbbYb`YfbYb'_ObbYbž'k À\fYbX'G]Y'j YfgWX]YXYbY'6]YfgcfhYb
dfcV]YfYb"'5i »YfXYa 'gc``hYb'G]Y'X]Y'fY[]cbU'Yb'K Y]bYž
]bgVYgcbXYfY'Ui g'XYa 'GUU'Y!I bghfi h!; YV]Yhž'b]WXh'j YfdUggYb
i bX'j Yfgi WXYbž'Y]bYb'`c_U'Yb'K Y]b'VY]'=\fYa '9ggYb'ni '[Yb]Y»Yb"

8]Y'_i`]bUf]gWXYb'JYfUbghU`hib[Yb']b; fY]n

?ca a Yb G]Y ni f f]Wk h][Yb NY]hžYf`YVYb G]Y X]Y _i `]bUf]gWk Yb < O\Ydi b_hY ; fY]n VY]a 'A\f`]Wk Yb ?i `]bUf]gWk Yb 'GhUXhZYgh" <]Yf Z]bXYb G]Y Y]b VYY]bXfi W_YbXYg 5b[YVch Ub 'hfUX]h]cbY``Yb GdY]gYbž'K Y]bYb i bX 6]YfYb gck]Y @]j Y!A i g]_ i bX J YfUbghU`hi b[Yb ZØf X]Y [UbnY : Ua]`]Y "8]Yg]gh Y]bY [fc » Ufh][Y ; Y`Y[Yb\Y]hžX]Y `c _U`Y ? ØWk Y]a [YgY``][Yb F U\a Yb ni '_cghYb"

CV'Ui Z'XYb'A Àf_hYbž']b'XYb'FYghUi fUbhg'cXYf'VY]'gdYn]Y``Yb JYfUbghU`hi b[Ybž'; fY]n'V]YhYh' \Rightarrow bYb'X]Y'A Ò[`]W_Y]hž'X]fY_h']b'X]Y h\Øf]b[]gW\Y'?ØW\Y'Y]bni hUi W\Yb''@UggYb'G]Y'g]W\'j cb'XYb 5fca Yb'i bX'XYb'\Yfn`]W\Yb'; Ugh[YVYfb'XYf'FY[]cb'j YfnUi VYfb°

B Uhi fYf`YVb]g'di f. K UbXYfb'i bX'F UXZU\fYb]b'XYf'l a [YVi b[

; $fY]n\check{z}'Y]b[YVYhhYhi]b:X]Y:gUbZhYb:<\emptyset[Y`:XYg:H\Øf]b[Yf:@UbXYg\check{z}]ghb]WXhibif:Y]bY:GhUXhia]h:fY]WXYf:; YgWX]WXhY<math>\check{z}$:gcbXYfb:Ui WX:Y]bkU\fYg:DUfUX]Yg:ZØf:BUhif:]YV\UVYf:ibX:GdcfhVY[Y]ghYfhY::8]Yla[YVib[:V]YhYh:Y]bY:J]Y`nU\`:Ub:A $\check{O}[:]WX_Y]hYb:ZØf:KUbXYf!ibX:FUXhcifYb\check{z}'X]Y:gckc\::ZØf:5bZÅb[Yf:U`g:Ui WX:ZØf:YfZU\fYbY$

8]Y'[YgUa hY'FY[]cb']gh'Xi fW. 'Y]b'[i h'Ui g[YVUi hYg'K UbXYf!
i bX'FUXk Y[YbYhn'W.UfU_hYf]g]Yfhž'XUg'X]Y'a U'Yf]gW.Yb
@UbXgW.UZhYb'i bX'UhYa VYfUi VYbXYb'5i gg]W.hYb'dYfZY_h'ni f
; Y'hi b['Vf]b[h''<]Yf'g]bX'Y]b][Y'XYf'VY`]YVhYghYb'Fci hYbž'X]Y'G]Y
b]W.h'j YfdUggYb'gc``hYb.

- ; fY]nYf'GhUXhk U`Xk Y[.'9]b'hfUi a \UZhYf'K Y[ž'XYf'g]WX Xi fWX'X]Y'K À`XYf'fi bX'i a '; fY]n'gWX`Àb[Y`h'i bX'a]h'XYf J]Y`ZU`h'XYf'\Y]a]gWXYb': `cfU'i bX': Ui bU'VYY]bXfi W_h"
- 9`ghYf!@UbXgWX UZhgk Y[.'8]YgY'Fci hY'Zc`[h'XYa 'JYf`Ui Z XYf'K Y]» Yb'9`ghYf'i bX'V]YhYh'a U`Yf]gWXY'5i gV`]W_Y'Ui Z XUg'K UggYf'i bX'i a `]Y[YbXY'K Y]XYb"
- FibXk Y['ni a 'GW\`cgg'; fY]n.'; Yb]Y» Yb'G]Y'Y]bY Ub[YbY\a Y'K UbXYfib[ž'X]Y'G]Y'X]fY_h'nia '\]ghcf]gW\Yb GW\`cgg'ZØ\fhž'k c'G]Y'X]Y'; YgW\]W\hY'XYf'FY[]cb'\Ui hbU\ Yf`YVYb'_ÒbbYb"

 $: \emptyset f `F UX ZU \setminus fY f `[]V h `Y g `Y V Y b g c `j]Y `Y `A `O[`]W _Y]hY b "`C V `G]Y `Y]bY Y b hgd Ub b hY `Hc i f `X i f W `X]Y `@Ub X g W UZh `c X Y f `Y]bY \Y f Ui g Zc f X Y f b X Y `Ghf Y W_Y `V Y j c f n i [Y b ž '; f Y]n `\ Uh `ZØ f `Y X Y b `Y hk Ug n i `V]Y hY b "`8]Y `H\ Ø f]b [Y f `Gh X hY _Y hhY `V Y]g d]Y `g k Y]g Y `ZØ \ f h Ø V Y f `j Y f g W]Y X Y b Y `C f hY `i b X `Y f a `O[`]W h `Y g `\ b Y b ž `X]Y `_i `hi f Y ``Y b <][\`][\hg `X Y f `F Y []c b `Ui Z `n k Y] `F À X Y f b `n i `Y b h X Y W_Y b "$

9]b 'VYgcbXYfg'VY`]YVhYf'F UXk Y[']gh'XYf'Fi bXk Y['Xi fW 'XUg J c[h`UbXž'XYf'i a ZUggYbX'Ui g[YgWk]`XYfh'i bX'Y]bZUWk'ni VYZU\fYb']gh"'8 UVY]'fUXY`b'G]Y'Xi fWk']Xm``]gWkY'8 OfZYfZ'[Yb]Y Yb XYb'5i gV`]W_'Ui Z'gUbZhY'<OfZ(Y)i bX'dUgg]YfYb'nU\`fY]WkY F Ughd` $AhnYZ'Ub'XYbYb'G]Y'Y]bY'DUi gY'Y]b`Y[Yb'_<math>ObbYb''$

8]Y' K UbXYfZfYi bXY'; fY]n 'cf[Ub]g]YfYb'fY[Y'a À»]['[YZØ\fhY Hci fYb'i bX'gdUbbYbXY'9j Ybhgž'X]Y'b]W\h'bi f'9]b\Y]a]gW\Yž gcbXYfb'Ui W\'6Ygi W\Yf'Ubn]Y\Yb"'8Ug'[Ya Y]bgUa Y'9f'YVYb'XYf BUhi fž'[YdUUfh'a]h'XYf'A Ò[`]W_Y]hž'; `Y]W\[Yg]bbhY'ni 'hfYZZYbž a UW\h'gc`W\Y'JYfUbghU'hi b[Yb'VYgcbXYfg'k Yfhj c``"

5_h]j]hÀh	6YgWkfY]Vib[$GWK k]Yf][_Y]hg[fUX$
K UbXYfb	9f_i bXYb^G]Y^X]Y	@Y]WXh^V]g^A]hhY^
	K UbXYfk Y[Y'fi bX	
	i a ˙; fY]n˙a]h	
	i bhYfgW\]YX`]W\Yb	
	@Àb[Yb'ibX'GWk]Yf]	
	[_Y]hg[fUXYb"	
F UXZU\fYb	BihnYb~G]Y~XUg	@Y]W\h`V]g`GW\kYf
	i a ZUggYbXY	
	FUXkY[YbYhnžXUg	
	ZØf::U\ffÀXYf'YXYb	
	Hmdg [·] [YY][bYh [·]]gh"	
; YZØ\fhY HcifYb	HfYhYb 'G]Y	JUf]UVY`
	gdUbbYbXYb	
	[Y ZØ \ fhY b	
	K UbXYfi b[Yb cXYf	
	FUXhci fYb 'VY]ž'i a	
	a Y\f'ØVYf'X]Y	
	FY[]cb'ni 'YfZU\fYb"	

9]b'k Y]hYfYg'<][\`][\h']gh'XYf'; fY]nYf'DUf_ž'XYf'g]W\'dYfZY_h'ZØf GdUn]Yf[Àb[Y'cXYf'Y]b'D]W_b]W_Y][bYh"'8]Y'[YdZY[hYb; fØbUb`U[Yb'i bX'X]Y'k i bXYfgW\ÒbYb'6`i a YbVYYhY'`UXYb'XUni Y]bž'X]Y'BUhi f']b'j c``Yb'NØ[Yb'ni '[Yb]Y»Yb"': Øf'U_h]j Y'6Ygi W\Yf []Vh'Yg'Ui W\'Gdcfha Ò[`]W_Y]hYb'k]Y'6YUW\j c``YmVU```cXYf'6ci `Y"

=a '< YfVgh'nY][h'g]W\'X]Y'B Uhi f']b'; fY]n']b'Y]bYa 'VYgcbXYfYb
: UfVYbfUi gW\"'8]Y'j]Y`Yb'@Ui VVÀi a Y'fi bX'i a 'X]Y'K UbXYf!'i bX
FUXk Y[Y'j Yfk UbXY`b'X]Y'I a [YVi b[']b'Y]b'k U\fYg': UfVYbgd]Y`ž
XUg'j cf'U``Ya ': chc[fUZ]Y!9bh\i g]UghYb'VY[Y]ghYfh"'8]Y'Zf]gW\Y
@ Zhi bX'X]Y'Fi \Y'XYf'B Uhi f'a UW\Yb'gc`W\Y'5i gZØ[Y'ni 'Y]bYa
i bj Yf[Ygg`]W\Yb'9f`YVb]g"

<]ghcf]gWXY'GWXÀhnY.'GWX`ÒggYf'i bX'A i gYYb]b'; fY]n</pre>

; fY]n']gh'b]Wkh'bi f'ZØf'gY]bY'a U`Yf]gWkY'5`hghUXh'VY_Ubbhž gcbXYfb'Ui Wk'ZØf'gY]bY'VYY]bXfi W_YbXYb'\]ghcf]gWkYb'GhÀhhYbž X]Y'h]YZ']b'XYf'; YgWk]WkhY'H\Øf]b[Ybg'j Yfk i fnY`h'g]bX"'8]Y nU\`fY]WkYb'GWk`ÒggYf'i bX'A i gYYb']b'XYf'FY[]cb'YfnÀ\`Yb ; YgWk]WkhYb'j cb'A UWkhž'?i `hi f'i bX'?i bgh'i bX'`UXYb'X]Y 6Ygi WkYf'Y]bž']b'j Yf[Ub[YbY'NY]hYb'Y]bni hUi WkYb"

 $= a \cdot GWX \cdot cggdUf_i \cdot a \cdot XUg'GWX \cdot cgg' \cdot Yfi \cdot a \cdot Z]bXYb'6Ygi WXYf \\ k \cdot bXYfgWX \cdot ObY'; \quad UfhYbUb \cdot U[YbZ'X]Y'ni \cdot a \cdot : \cdot Ub]YfYb'Y]b \cdot UXYb''8]Y \\ DUf_Ub \cdot U[YZ'X]Y'U \cdot g'Y]bYf'XYf' A \cdot hYghYb' \cdot @UbXgWX UZhg[AfhYb \\ H \ Øf]b[Ybg'[] \cdot hZ'V]YhYh'Y]bYb' \ Yff']WXYb'6 \ \]W_'Ui Z'X]Y'GhUXh'i bX \\ X]Y'i \cdot a [YVYbXYb' < Ø[Y'''8]Y' \ Ufa cb]gWXY'JYfV]bXi b['j cb'BUhi fi bX'5fWX]hY_hi f'a UWXh'XYb'DUf_'ni Y]bYa' VY']YVhYb'N]Y''ZØf \\ GdUn]Yf[Ab[Y''']$

9]b k Y]hYfYg \]ghcf]gWk Yg \<][\`][\h']gh XUg J c [h`Ub Xa i gYi a ž XUg g]Wk \]b XYf Y\Ya U`][Yb F Yg]XYbn XYf : ØfghYb j cb F Yi \Rightarrow VYZ]b XYh" \<]Yf _ ObbYb 6 Ygi Wk Yf X]Y fY []c b U`Y ; YgWk]Wk hYž ?i bgh i b X ?i `hi f Yb h X Y W_Yb " 8 Ug A i gYi a 'n Y][h Y]b Y J]Y `n U\``j cb 9I d c b UhYb ž X]Y j cb XYf @Y V Y b gk Y]gY `X Yf A Y b g Wk Yb]a 'J c [h`Ub X V]g \\]b 'ni ']b Xi ghf]Y ``Yb '9b hk] \W_`i b [Yb 'i b X 'hf U X]h]c b Y ``Yb \< Ub X k Yf_Yb 'fY] \W Yb "

• 5fW.Àc`c[]gW.Y': i bXYž'X]Y'V]g']b'X]Y'GhY]bnY]h

ni fØW fY]WXYb

- 9]bY'i a ZUb[fY]WXY'GUa a `i b['j cb'Jc`_g_i bgh'i bX < UbXk Yf_
- K YWXgY`bXY'GcbXYfUi gghY``i b[Ybž'X]Y'j YfgWX]YXYbY i `hi fY``Y'H\Ya Yb'UVXYW Yb

9]b'k Y]hYfYf'k]Wkh][Yf'_i `hi fY``Yf'5b`Ui Zdi b_h']b'; fY]n']gh'XUg' GhUXha i gYi a '; fY]n"'<ci gYX']b'Y]bYa 'Y\Ya U`][Yb < UbXY`g\Ui gž'V]YhYh'XUg'A i gYi a 'gY\f']bhYfYggUbhY'9]bV`]W_Y']b X]Y'GhUXh[YgWk]WkhY'j cb'; fY]n"'8]Y'5i gghY``i b[Yb'i a ZUggYb U``hÀ[`]WkY; Y[YbghÀbXYž'\]ghcf]gWkY'8c_i a YbhY'i bX : chc[fUZ]Ybž'X]Y'X]Y'9bhk]W_`i b['XYf'GhUXh'ØVYf'X]Y'\$U\f\i bXYfhY\]bk Y['UVV]`XYb"

: Øf:X]Y Yb][Ybž:X]Y :g]W\ :ZØf:X]Y :]bXi ghf]Y ``Y :J Yf[Ub[Yb\Y]h
]bhYfYgg]YfYbž:[]Vh'Yg:XUg'HYW\ b]_a i gYi a ž:XUg'X]Y
hYW\ b]gW\ Yb :9ffi b[YbgW\ UZhYb :XYf'FY[]cb '\Yfj cf\YVh" <]Yf'g]bX
j]Y`Y '\]ghcf]gW\ Y :A UgW\]bYb :i bX :; Yf\ AhY :Ui g[YghY ``hz'X]Y :X]Y
]bXi ghf]Y ``Y :FYj c`i h]cb :i bX :X]Y :XUa]h'j YfVi bXYbYb
J Yf\ AbXYfi b[Yb :]b :XYf'FY[]cb :XUfghY ``Yb"</pre>

9]b'6Ygi W\']b'; fY]n'k ÀfY'b]W\h'j c``ghÀbX][ž'c\bY'XUg
VYY]bXfi W_YbXY'; YVÀi XY'XYg'@Yi W\hYbVi f[ž'Y]bY
VYY]bXfi W_YbXY'<Ò\YbVi f[ž'X]Y'Yhk U'&\$'?]`ca YhYf'YbhZYfbh
`]Y[h'''G]Y'[]`h'U`g'Y]bYg'XYf'Gma Vc``XYf'h\Øf]b[]gW\Yb'6i f[Yb'i bX
V]YhYh'Y]bYb'gdY_hU_i `ÀfYb'6`]W_'Ui Z'X]Y'GUU`Y!GW\`Y]ZY'i bX'X]Y
i a `]Y[YbXY'@UbXgW\UZh''

5 hhfU_h]cb	<][\`][\hg	² ZZbi b[gnY]hYb
GWX`cgg'; fY]n	FYbU]ggUbWY!ibX	8]!Gcž [*] %\$.\$\$!%, .\$\$
	6UfcW_UfWX]hY_hi fž	l ∖f
	GUa a `i b[Yb	
Jc[h`UbXa i gYi a	FY[]cbU`Y	A]!Gcž'%%.\$\$!%+.\$\$
	; YgWX]WXhYž?ibgh	l ∖f
	ibX'?i`hif	
GhUXhaigYia; fY]n	<]ghc f]gW\ Y	8]!Gcž [*] %\$.\$\$!%*.\$\$
	8c_i a YbhYž	l ∖f
	5``hU[g[Y[YbghÀbXY	

5 hhfU_h]cb	<][\`][\ hg	² ZZbi b[gnY]hYb
HYWMb]_a i gYi a	HY WX b]gWX Y	A]!Gcž ⁻ %\$.\$\$!%+.\$\$
	9ffi b[YbgW\UZhYb	l \f
@YiWhYbVif[GdY_hU_i `ÀfY	5df]`!C_hž
	5i gg]WN hž	%\$.\$\$!%, .\$\$`I\f
	6i f[YbZØ\fi b[

8]Y'GWX`ÒggYf'i bX'A i gYYb']b'; fY]n'g]bX'b]WXh'bi f
GY\Ybgk ØfX][_Y]hYbž'gcbXYfb'Ui WX'CfhYž'Ub'XYbYb'6Ygi WXYf'j]Y`
ØVYf'X]Y'ZUgW]bUh]b['; YgWX]WXhY'i bX'XUg'?i `hi fYfVY'X]YgYf
FY[]cb'`YfbYb'_ÒbbYb'''A]h'YXYf'bYi Yb'9bhXYW_i b['k YfXYb'X]Y
; YgWX]WXhYb'`YVYbX][ži bX'X]Y'6Ygi WXYf'ZØ\`Yb'g]WX']b'X]Y
j YfgWX]YXYbYb'9dcWXYb'XYf'XYi hgWXYb'; YgWX]WXhY'j YfgYhnh''

J YfUbghU`hi b[Yb'i bX': YghY.'8 Ug'_i `hi fY``Y @YVYb']b'; fY]n

; fY]nž'X]Y a U`Yf]gW\Y'GhUXh']b'H\Øf]b[Ybž'V]YhYh'b]W\h'bif
UhYa VYfUi VYbXY'@UbXgW\UZhYb'i bX'\]ghcf]gW\Y'GhÀhhYbž'gcbXYfb
]gh'Ui W\'Y]b'<chgdch'ZØf'_i `hi fY``Y'JYfUbghU`hi b[Yb'i bX': YghYž
X]Y'XUg'[UbnY'\\\f'ØVYf'ghUhhZ]bXYb"'8]YgY'9fY][b]ggY'g]bX'Y]bY
kibXYfVUfY'; Y`Y[Yb\Y]hž'X]Y'hfUX]h]cbY``Y'H\Øf]b[Yf'?i `hi f
_YbbYb'ni '`YfbYb'i bX'X]Y'`YVYbX][Y'; Ya Y]bgW\UZh'\Ui hbU\'ni
Yf`YVYb"

 $9]bYg`XYf`<][\ \ `][\ \ hg`]a \ `JYfUbghU`hi b[g_U`YbXYf`]gh`XUg`; fY]nYfGhUXhZYghž`XUg`YXYg`&J\f`]a \ `5i [i gh`ghUhhZ]bXYh"`<]Yf`j Yfk UbXY`hg]W\ `X]Y`5`hghUXh`]b`Y]bY``YVYbX][Y`: Ygha Y]`Y`a]h`GhÀbXYbž@]j Ya i g]_`i bX`j]Y`ZÀ`h][Yb`_i `]bUf]gW\Yb`5b[YVchYb"`6Ygi W\Yf_\ObbYb`g]W\`Ui Z$

- HfUX]h]cbY``Y'<UbXkYf_ga Àf_hY
- ?i bgh! i bX : chc[fUZ]YUi gghY ``i b[Yb
- 9]b'Vi bhYg'6 \emptyset \bYbdfc[fUa a 'a]h'`c_U`Yb'? \emptyset bgh`Yfb

8 UgʻGhUXhZYghʻn]Y\hʻA YbgW\YbʻUi gʻXYfʻ[UbnYbʻFY[]cbʻUbʻi bX ZÒfXYfhʻb]W\hʻbi fʻX]Yʻ`c_U`Yʻ?i`hi fžʻgcbXYfbʻUi W\ʻXYb Ni gUa a Yb\U`hʻXYfʻ; fY]nYfʻ; Ya Y]bgW\UZh" 9]b k Y]hYfYg VYXYi hYbXYg 9j Ybh]gh XYf; fY]nYf

K Y]\bUW hga Uf_hž XYf]a '8 YnYa VYf ghUhhZ]b XYh K À\fYbX XYf

_U`hYb K]bhYfa cbUhY j Yfk UbXY`h g]W XYf A Uf_h]b Y]b Y ZYgh`]W Y

C UgY "8]Y ZYgh`]W XY_cf]YfhY 5`hghUXh i bX X]Y Zi b_Y`bXYb @]W hYf

gcf[Yb ZØf Y]bY [Ya Øh`]W Y 5ha cgd\ÀfY " <]Yf \ UVYb 6Ygi W Yf

X]Y A Ò[`]W _Y]hž]b X]Y ZYgh`]W Y Gh]a a i b[Y]bni hUi W Yb i bX.

- FY[]cbU`Y`? Ògh`]W_Y]hYb`k]Y`; `Ø\kY]b`i bX`6fUhk i fgh`ni
 [Yb]Y» Yb
- < UbXk Yf_g_i bgh'j cb '`c_U`Yb'? Øbgh`Yfb 'ni 'Yfk YfVYb
- $8]Y'nU'fY]WYb'5hhfU_h]cbYb'ZØf'?]bXYf'ni 'Yf_i bXYb$

 $8]Y Y]bn][Ufh][Y @U[Y ; fY]n 'nk]gWX Yb' < \emptyset[Y `b' i b X `K À `XYfb `hfÀ[h ni f'VYgcbXYfYb' A U[]Y `XYg' K Y]\bUWX hga Uf_hYg' VY]ž'gc XUgg' Yg' ZØf X]Y [UbnY': Ua]`]Y Y]b' i bj Yf[Ygg`]WX Yg' 9f`YVb]g' k]fX"$

. , , '@c_U`Y': YghY'i bX'6fÀi W\Y

BYVYb [fÒ» YfYb J YfUbghU`hi b[Yb []Vh'Yg]b; fY]n Ui WX j]Y`Y
_`Y]bYfY : YghY i bX ``c _U`Y 'HfUX]h]cbYbž'X]Y 'XUg _i `hi fY``Y '@YVYb
XYf 'GhUXh'VYfY]WX Yfb " 8 Uni '[Y\Òfh'XUg 'Gcbbk YbXZYi Yfž'XUg
YXYg '\J\f']a '\dagger b]'[YZY]Yfh'k]fX" '8]YgYg : YghnYbhfi a 'XYf
Gca a Yfk YbXY 'V]YhYh'Y]bY 'k i bXYfVUfY'; Y`Y[Yb\Y]hž'XYb
Gca a Yf ni 'VY[fØ» Ybž'cZh'a]h'A i g]_ž'HUbn'i bX'Y]bYa '[YgY``][Yb
6Y]gUa a YbgY]b"'

9]b'k Y]hYfYg'_i `hi fY``Yg'9fY][b]g']gh'XUg'; fY]nYf'<Y]a UhZYghž'XUg X]Y'HfUX]h]cbYb'i bX'6fÀi WXY'XYf'FY[]cb'nY`YVf]Yfh''@c_U`Y HfUWXhYbž'A i g]_[fi ddYb'i bX'HÀbnY'YfZfYi Yb'b]WXh'bi f 9]b\Y]a]gWXYž'gcbXYfb'Ui WX'Hci f]ghYbž'X]Y'g]WX'ZØf'XUg'@YVYb']b X]YgYf'WXUfa UbhYb'GhUXh']bhYfYgq]YfYb''

. . . '?i `hi fY``Y 'J]Y`ZU`h

9]b'k]Wkh][Yg'AYf_aU`XYg'_i`hifY``Yb'@YVYbg']b'; fY]n']gh'X]Y J]Y`ZU`h'XYf'JYfUbghU`hib[Yb"'BYVYb'Aig]_!'ibX'HUbnZYghYb Z]bXYb'UiW\'nU\`fY]W\Y'?ibgh!'ibX'<UbXkYf_gaYggYb'ghUhhž'X]Y _fYUh]jY'HU`YbhY'Uig'XYf'FY[]cb'dfÀgYbh]YfYb"'8]YgY'AYggYb'g]bX Y]bY`\Yfj cffU[YbXY`7\UbW\ž'Y]bn][Ufh][Y`\UbX[Ya UW\hY DfcXi _hY`ni `YbhXYW_Yb`i bX`X]Y`?i bghgnYbY`j cb`; fY]n`ni i bhYfghØhnYb"

 $8]Y `GhUXh` \setminus Uh``Ui \ WX `Y]bY`` Ub[Y'; YgWX]WX hY `XYf`H\YUhYf!`i bX \\ A i g]_Ui ZZØ \setminus fi b[Yb"8]Y'; fY]nYf`GhUXh\U``Y']gh`c Zh'; Ugh[YVYf`ZØf?cbnYfhYž`H\YUhYfghØW_Y`i bX`UbXYfY'_i `hi fY``Y'JYfUbghU`hi b[YbžX]Y`gck c\``bUh]cbU`Y'U`g`Ui WX`]bhYfbUh]cbU`Y'? Øbgh`Yf dfÀgYbh]YfYb"'J cb'?`Ugg]_`V]g`FcW_ž`\]Yf`Z]bXYh`YXYf`Yhk Ug`bUWX gY]bYa '; YgWXa UW_"$

8]YgY'J YfUbghU`hi b[Yb'V]YhYb'b]W\h'bi f'I bhYf\U`hi b[ž'gcbXYfb Ui W\'Y]bY'D`UhhZcfa ž'i a 'a]h'9]b\Y]a]gW\Yb'ni ']bhYfU[]YfYb'i bX X]Y'; Ya Y]bgW\UZh'ni 'Yf`YVYb"'G]Y'g]bX'Y]bY'hc``Y'; Y`Y[Yb\Y]hž'X]Y \Yfn`]W\Y'; UghZfYi bXgW\UZh'XYf'; fY]nYf'ni 'YfZU\fYb"

#b"; fY]n"]gh'XUg'_i `hi fY``Y'@YVYb'Y]bY'`YVYbX][Y'A]gWXib['Ui g
HfUX]h]cbž'; Ya Y]bgWXUZh'i bX'GdU» "'CV'G]Y'Y]b': Ygh]j U``a]h
: fYi bXYb'VYgi WXYb'cXYf'Y]bZUWX'bi f'X]Y'5ha cgd\AfY'XYf'GhUXh
]b'Y]bYa 'XYf'j]Y`Yb'7UZAg'[Yb]Y»Yb''; fY]n'n]Y\h'6Ygi WXYf'a]h
gY]bYf'_i `hi fY``Yb'J]Y`ZU`h'i bX'gY]bYa 'Y]b`UXYbXYb'7\Ufa Y']b

; Y\Y]a h]ddg'ZØf'Y]bYb'i bj Yf[Ygg`]W\Yb 5i ZYbh\U`h']b'; fY]n

; $fY]n\check{z}^*XUg^*\dot{z}^*k Y^*]a^*< YfnYb^*H\@f]b[Ybg\check{z}^*\Uh^*k Y]h^*a Y\f^*ni^*V]YhYb\check{z}$ U`g^*a Ub^*Ui Z'XYb^*YfghYb^6^`]\w_^g]Y\h''^5VgY]hg^*XYf^*VY_UbbhYb GY\Ybgk \@fX][_Y]hYb^*[]Vh^*Yg^*Y]b][Y^; Y\Y]a h]ddg \check{z}^*X]Y^*\infty fYb 5i ZYbh\U^h'i bj Yf[Ygg^*]\w^*a U\w\Yb^*k YfXYb''^HUi \w\Yb^*G]Y^*Y]b^*]b^*X]Y j YfghY\w_hYb^*K]b_Y^*X]YgYf^*\w\Ufa UbhYb^*GhUXh^*i bX^*YbhXY\w_Yb^*G]Y X]Y^*: U\w\hYb^*z^*X]Y^; fY]n^*gc^*VYgcbXYfg^*a U\w\Yb''

JYfVcf[YbY'7UZÅg'i bX'6i WX\UbX`i b[Yb

9]b i bj Yf[Ygg`]WX Ygʻ9f`YVb]gʻ]b ; fY]n VY[]bbhc Zha]h Y]b Ya 6Ygi WX ']b Y]b Ya 'XYf 'WX Ufa UbhYbž'_`Y]b Yb '7 UZÅg" '6 Ygcb XYfg Ya d ZY\ `Ybgk Yfh']gh XUgʻ7 UZÅ : fcgWX _ Ob][ž k c 'G]Y 'b]WX h bi f _ Ogh`]WX Yb '? UZZYYž gcb XYfb 'Ui WX '\ Ui g[Ya UWX hY '? i WX Yb ']b 'Y]b Yf [Ya Øh`]WX Yb '5 ha cgd\AfY '[Yb]Y » Yb '_ObbYb" '

9]b k Y]hYfYg A i gg ']gh X]Y '6 i W \ Ub X `i b ['Ua 'A Uf_hž Y]b k U\fYg 'DUfUX]Yg 'ZØf '6 ØW Yf`]YV\UVYf" '6 Ygi W Yb 'G]Y 'XYb '@c_U`ž ghÒVYfb 'G]Y ']b 'XYb 'F Y[U`Yb 'i b X 'Z]b XYb 'G]Y 'j]Y ``Y]W h Y]b 'd UUf fY[]c b U`Y '6 ØW Yfž 'X]Y ' \Rightarrow fY '5 i ZYb h\ U`hgnY]h ']b '; fY]n 'VYfY]W Yfb "'

; Y\Y]a b]gj c``Y`K UbXYfk Y[Y

; fY]n^]ghii a [YVYb^j cb^Y]bYf^UhYa VYfUi VYbXYb^BUhi f^UbXgW\UZhž X]Y^g]W\dYfZY_h^ZØf^GdUn]Yf[Ab[Y^i bX^K UbXYfi b[Yb^Y][bYh"^9]b cZh^ØVYfgY\YbYf^K Y[^]gh^XYf^; fY]nYf^K U^X^Y\fdZUX"^8]YgYf Fi bXk Y[^]bZcfa]Yfh^b]W\h^bi f^ØVYf^X]Y^^c_U^Y^: `cfU^i bX^: Ui bUž gcbXYfb^V]YhYh^Ui W\Zf]YX^]W\Y^5i gV^]W_Y^Ui ZX]Y^I a [YVi b[" ⇒XYU^*ZØfY]bYb^YbhgdUbbhYb^BUW\a]hhU[°

 $: \varnothing f^*X]Y^*5VYbhYi Yf^*i gh][Yb^*[]Vh^*Yg^*X]Y^*; fY]nYf \\ < \grave{O} Ybk UbXYfi b[\check{z}^*X]Y^* = bYb^*VYY]bXfi W_YbXY^*5i gV^*]W_Y^*Ui Z^*X]Y^*GhUXh^*i bX^*X]Y^*i a `]Y[YbXYb^*HÀ`Yf^*V]YhYh^*^DUW_Yb^*G]Y^*Y]b^*D]W_b]W_$

8]Y_`Y]bYb A Af_hY i bX 6ci h]ei Yb

 $6 Y gi \ WX Yb `G]Y `X]Y `_`Y]b Yb Z``c _U`Yb `A \ Af_hYZ`X]Y `c Zh`Ua \\ K \ c WX Yb Yb XY `ghUhhZ]b XYb "`<]Yf `Z]b XYb `G]Y `Zf]g WX Y `Dfc Xi _hY `XYf \\ F Y[]cb `i b X `\ Ub X[YZYfh][hY `GcijYb]fg "`8 Yf `K c WX Yba Uf_h`Ua \\ G WX `c gg \ c Z `V]YhYh `Y]b Y `[fc \ Y `5 i gk U \ ``Ub `fY[]cb U`Yb \\ ? Ogh`] WX _Y]hYb Z `j cb `Zf]g WX Ya `C Vgh`V]g `ni `h\ Øf]b[]g WX Yb \\ G d Yn] U`]hAhYb"$

Ni gÀhn`]W\[]Vh'Yg']b'XYf'5`hghUXh'Y]b][Y'W\Ufa UbhY'6ci h]ei Ybž X]Y'Y]bn][Ufh][Y'AcXY'i bX'5\W\ggc]fYg'UbV]YhYb"'9]b'6Ygi W\]b XYf'AcXYVci h]ei Y'?`Y]b'/:Y]b 'k]fX'G]Y'a]h'`c_U`Yb 8Yg][bg'i bX'\UbX[Ya U\\hYb'DfcXi hYb'\ØVYffUg\\Yb"

?i`hifY``YjYfghYW_hYGWXÀhnY

5VgY]hg'XYf'VY_UbbhYb'AigYYb'[]Vh'Yg'j]Y`Y'_i`hifY``Y'?`Y]bcXY]b'; fY]n'ni 'YbhXYW_Yb"'9]bY'\Yfj cffU[YbXY'K U\``]gh'XUg' ?i bgh\Uig'; fY]nž'k c'fY[Y`a À»]['5igghY``i b[Yb'fY[]cbU`Yf ?Øbgh`Yf'ghUhhZ]bXYb"'<]Yf'_ÒbbYb'G]Y'?i bghk Yf_Y']b'Y]bYa]bh]a Yb'FU\a Yb'[Yb]Y»Yb'i bX'j]Y``Y]W\h'gc[Uf'XYb'Y]b'cXYf UbXYfYb'?Øbgh`Yf'hfYZZYb"

5i » YfXYa ``c\bh'g]W\ 'Y]b'6Ygi W\ 'XYf'GhUXhV]V`]ch\Y_'; fY]nž'X]Yb]W\h'bi f'Y]bY': YbghYf']b'X]Y'J]Y`ZU`h'XYf'@]hYfUhi f'V]YhYhž'gcbXYfbUi W\ 'fY[Y`a À»]['@Ygi b[Yb'i bX'K cf_g\cdg'j YfUbghU`hYh"'9g']ghXYf'dYfZY_hY'Cfhž'i a 'a]h'9]b\Y]a]gW\Yb']bg'; YgdfÀW\'ni_ca a Yb'i bX'X]Y'?i `hi f'XYf'GhUXh'bÀ\Yf'_YbbYbni `YfbYb"

Fi\][Y'D'ÀhnY'ni a '9bhgdUbbYb

XYYf'VfUi Wkha U`Y]bY'DUi gY°'; fY]n'V]YhYhij]Y`Y'fi \][Y'D`ÀhnYž
X]Y'dYfZY_hig]bXži a 'X]Y'GYY`Y'VUi a Y`b'ni '`UggYb"'8Yf'
GWk`cggdUf_'; fY]n']gh'Y]b'k i bXYfgWk ObYf'Cfh'ZØf'Y]bYb
YbhgdUbbhYb'GdUn]Yf[Ub["'<]Yf'Z]bXYb'G]Y'gWkUhh][Y'6Ài a Y'i bX
]Xm``]gWkY'K]YgYbž']XYU``ZØf'Y]b'D]W_b']W_cXYf'Y]bZUWk'bi fini a</pre>

: Øf'Y]bY'bcW\fi\][YfY'5ha cgd\AfY'VYgi W\Yb'G]Y'XYb'
: `cfUVUi dUf_ž'k c'G]Y'Ui W\'Y]bYb'_`Y]bYb'HY]W\'Z]bXYb"'8]Yg']gh
Y]bYf'XYf'; Y\Y]a h]ddg'ZØf'U``Yž'X]Y'XYa '\Y_h]gW\Yb'GhUXh`YVYb
YbhZ]Y\Yb'a OW\hYb"

; $Y \setminus Y$]a $Y \cdot D \cdot A hn Y \cdot a$]h $\cdot 6 \cdot]W_U \cdot Ui Z \cdot X]Y \cdot GhUXh$

; Yb]Y» Yb 'G]Y 'X]Y 'UhYa VYfUi VYbXY '5i gg]Wk h'Ui Z'; fY]n'j cb Ui g[Yk À\`hYb '5i gg]Wk hgdi b_hYb "'9]bYg 'XYf 'VYghYb 'D`ÀhnY ']gh'X]Y ' $< c \ Yb \ DZc fhY \check{z}'X]Y 'g]Wk 'bi f'Y]bYb '_i fnYb 'GdUn]Yf[Ub['j cb 'XYf GhUXh'YbhZYfbh'VYZ]bXYh'i bX '\$bYb 'Y]bY '[fc > Ufh][Y 'DYfgdY_h]j Y Ui Z'XUg'HU`'i bX 'X]Y 'GhUXh'j YfgWk UZZh''$

9]b'k Y]hYfYf'[Y\Y]a Yf'5i gg]W\hgdi b_h']gh'XYf'5`hY'N]f_i gž'k c G]Y'Y]bYb'DUbcfUa UV`]W_'ØVYf'X]Y'8ÀW\Yf'j cb'; fY]n'[Yb]Y $^{\circ}$ Yb _ObbYb''DUW_Yb'G]Y' $^{\circ}$ fY'?Ua YfU'Y]b'''X]YgY'5i gg]W\h'a OW\hY a Ub'ZYgh\U`hYb''

8]YBUWhgY]hYjcb; fY]n

K Ybb'X]Y'GcbbY'i bhYf[Y\hž'j Yfk UbXY`h'g]WX'; fY]n']b'Y]bYb'Cfh j c``Yf'gi Vh]`Yf'A U[]Y"'6Ygi WXYb'G]Y'XUg'5`hY'H\YUhYf'; fY]nži a Y]bY'`c_U`Y'5i ZZØ\fi b['ni '[Yb]Y»Yb"'8]Y'5ha cgd\ÀfY'XYg\]ghcf]gWXYb'H\YUhYfg']gh'gWX`]WXhk Y['VYnUi VYfbX'i bX'XYfdYfZY_hY'FU\a Yb'ZØf'Y]bYb'5VYbX']b'X]YgYf'_i `hi fY``Yb'GhUXh"

9]b'_`Y]bYf'; Y\Y]a h]dd']gh'Ui W\'XYf' 6`Ui Y'GU`cb ž'Y]bY'6Ufž X]Y'Y]bY'YI nY``YbhY'5i gk U\``Ub'7cW_hU]`g'V]YhYh''<]Yf'_0bbYb'G]Y XYb'5VYbX'Ui g_`]b[Yb'`UggYb'i bX'bYhHY'; YgdfÀW\Y'a]h'UbXYfYb 6Yqi W\Yfb'00

; fY]n'\Uhij]Y`ni 'V]YhYbži bX`Yg``c\bhg]W\žX]Y`GhUXh`Xi fW\`X]Y
j]Y`Yb'_`Y]bYb'; Y\Y]a h]dg'bcW\`]bhYbg]j Yf`ni 'Yf`YVYb"'9[U`ž'cV
G]Y`]b`Y]bYa '\Y]a Y`][Yb`7UZÅ`YbhgdUbbYb`cXYf`X]Y`BUhi f
[Yb]Y»Yb` '; fY]n`Yfk UfhYh`G]Y`a]h`cZZYbYb`5fa Yb`i bX`j]Y`Yb
_ VYffUgW\i b[Yb°

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