

$7cYgZY^X^YbhXYW_Yb.^; YgWX]WXhYž^; YbiggibX^[Y\Y]aY^<][\^][\hg$

9bhXYW_Yb^G]Y^X]Y^W\Ufa UbhY^5`hghUXh^j cb^7cYgZY`Xž _i`]bUf]gW\Y^<][\`][\hgžhfUi a \UZhY^BUhi fž^YVYbX][Y^?i`hi f ibX^ZUa]`]YbZfYibX`]W\Y^5_h]j]h\hYb^ZØf^i bjYf[Ygg`]W\Y A ca YbhY°



K]``_ca a Yb`]b`7cYgZY`XžY]bYf`W\Ufa UbhYb`GhUXh`]a `<YfnYb`j cb BcfXf\Y]b!K YghZU`Yb``8]YgY`_`Y]bYž'UVYf`ZY]bY`GhUXh`V]YhYhY]bY [Y`i b[YbY`A]gW\i b[`Ui g`\]ghcf]gW\Yf`5fW\]hY_hi fž`_Ògh`]W\Yf ?i`]bUf]_`i bX`i bVYfØ\fhYf`BUhi f"`CV`Xi 'Y]b`: Ub`j cb [YgW\]W\hghf\d\Mh][Yb`5`hghUXh[UggYb`V]ghž'X]Y`VYghYb``c_U`Yb FYghUi fUbhg`Yf_i bXYb`a ÒW\hYghcXYf`X]Y`a U`Yf]gW\Yb`K UbXYf! i bX`FUXk Y[Y`XYf`I a [YVi b[`YbhXYW_Yb`k]``gh``7cYgZY`X`\UhU``Yg`ni 'V]YhYb"`\d\X]YgYa '5fh]_Y``bY\a Yb`k]f`X]W\`a]h`Ui Z`Y]bY FY]gY`Xi fW\XX]Y`GhUXh`i bX`nY][Yb`X]f`X]Y`VYghYb`D`\dhnY\z\ZYf\gh\Uh'\b\X]Y`GhUXh`i bX`nY][Yb`X]f`X]Y`VYghYb`D`\dhnY\z\ZYf\gh\Uh'\b\X]Y`BY\d\X\X]Y`GhUXh`i bX`nY][Yb`X]f`Y]bYb`i bj Yf[Ygg`]W\Yb 5i ZYbh\U`h"`A UW\XX]W\XVYfY]h`ZØf`Y]bYb`i bj Yf[Ygg`]W\Yb

$9bhXYW_ib[XYf']ghcf]gWXYb'5`hghUXh'jcb7cYgZY`X$

8]Y`\]ghcf]gW\Y`5`hghUXh'j cb`7cYgZY`X`]gh'Y]b`k U\fYgʻ¾ k Y``]a < YfnYb'j cb`BcfXf\Y]b!K YghZU`Yb"': Øf`U``Yž'X]Y'; YgW\]W\hY'i bX 5fW\]hY_hi f``]YVYbž'\Uh'X]YgY`W\Ufa UbhY`GhUXh'j]Y``ni 'V]YhYb"'6Y] Y]bYa '6i a a Y``Xi fW\'X]Y`a U`Yf]gW\Yb'; UggYb'ZØ\`h'a Ub'g]W\']b Y]bY`UbXYfY`NY]h'j YfgYhnh"'8]Y`[i h'Yf\U`hYbYb'; YVÀi XY`i bX [Ya Øh`]W\Yb'D`ÀhnY``UXYb'XUni 'Y]bž'j Yfk Y]`Yb'i bX`Yf_i bXYb'ni _O`bbYb"

8 Yf'A Uf_hd`Uhn'j cb'7cYgZY`X']gh'XYf'nYbhfU`Y'Di b_h'i bX'XYf
]XYU`Y'5i g[Ub[gcfh'ZØf'Y]bYb'Fi bX[Ub['Xi fW\'X]Y'5`hghUXh"
I a [YVYb'j cb'\]ghcf]gW\Yb': UW\k Yf_\Ài gYfbž'j YfghfÒa h'X]YgYf
D`Uhn'Y]bYb'VYgcbXYfYb'7\Ufa Y"'<]Yf'Z]bXYb'fY[Y`a À»][
K cW\Yba Àf_hY'ghUhhž'Ui Z'XYbYb'9]b\Y]a]gW\Y'i bX'6Ygi W\Yf
Zf]gW\Y'fY[]cbU`Y'DfcXi _hY'Yfk YfVYb'_ObbYb"'5b'XYb
K cW\YbYbXYb'j Yfk UbXY`h'g]W\'XYf'A Uf_hd`Uhn'ni XYa ']b'Y]b
VY`]YVhYf'Cfh'ZØf'J YfUbghU`hi b[Yb'i bX': YghY"

9]b UVgc`i hYg`<][\`][\h`XYf`5`hghUXh`]gh`X]Y` $Gh"!@Ua\ VYfh]!?]fWX\ Y"`A\]h`]\ fYb\ VYY]bXfi\ W_YbXYb`HØfa\ Yb`]gh`g]Y
b]WXh`bi f`Y]b`K U\fnY]WXYbž`gcbXYfb`Ui WX`Y]b`k]WXh][\Yf`HY]``XYf
;\YgWX]WXhY`j cb`7cYgZY`X"`8]Y`?]fWXY`ghUa\ a\ h`Ui\ g`XYa\ '%(\"\\\\\f\\i\ bXYfh`i\ bX`VYgh]WXh`Xi\ fWX\]\fY`[\ch]gWXY`5fWX]hY_hi\ f"`9]b
6Ygi\ WX`]a\ \=\bYfYb``c\bh`g]WX\ \`8]Y`ZUfVYbZfc\Yb';\`UgZYbghYf\\Yfn\A\`Yb'Y]bXfi\ W_gj\ c``Y`V]V`]gWXY';\YgWX]WX\hYb`i\ bX`gWX\UZZYb`Y]bY\\YqcbXYfY`5ha\ cqd\\AfY"$

■ XYf'BÀ\Y'XYf'Gh"!@Ua VYfh]!?]fW\Y'VYZ]bXYh'g]W\'XUg'
GhUXhaigYia '7cYgZY`Xž'XUg'X]Y'; YgW\]W\hY'XYf'GhUXh
UbgW\Ui`]W\'Xc_iaYbh]Yfh"'<]Yf'_\ObbYb'6Ygi W\Yf'aY\f'\ØVYf'X]Y
9bhk]\W_\`ib['XYf'GhUXh\z'gck]Y'\ØVYf'VYXYihYbXY'\]ghcf]gW\Y
9fY][b]ggY'YfZU\fYb"'8]Y'5igghY``ib[Yb'g]bX'UVkYW\g`ib[gfY]W\
ibX'V]YhYb'gdUbbYbXY'9]bV`]\W_Y']b'XUg'@YVYb'XYf'7cYgZY`XYf
ØVYf'X]Y'\J\f\ibXYfhY'\]bkY["

9]b'k Y]hYfYf'; Y\Y]a h]dd']gh'X]Y: UW k Yf_ghfU» Yž'k c'Y]b][Y'XYf À'hYghYb'<Ài gYf'XYf'GhUXh'ni 'Z]bXYb'g]bX"'8]Y'[i h'Yf\U'hYbYb': UW\k Yf_\Ai gYf'a]h']\fYb'Vi bhYb': UggUXYb'YfnÀ\`Yb; YgW\]W\hYb'Ui g'`Ab[gh'j Yf[Ub[YbYb'NY]hYb"'6Y]'Y]bYa
GdUn]Yf[Ub['Ybh`Ub['X]YgYf'GhfU» Y'_Ubb'a Ub'X]Y'hmd]gW\k YghZ\A`]gW\Y'5fW\]hY_hi f'VYk i bXYfb'i bX'9]bV`]W_Y']b'X]Y
<UbXk Yf_g_i bgh'XYf'XUa U`][Yb'NY]h'[Yk]bbYb"

8]Y'5`hghUXh'j cb'7cYgZY`X'V]YhYh'b]WXh'bi f'\]ghcf]gWXY
GY\Ybgk ØfX][_Y]hYbž'gcbXYfb'Ui WX'j]Y`Y'[Ya Øh`]WXY'7UZÅg'i bX
@ÀXYb"'8]Y'_`Y]bYb'6ci h]ei Yb'i bX'; YgWXÀZhY'g]bX'dYfZY_hž'i a
Y]b'Y]bn][Ufh][Yg'Gci j Yb]f'cXYf'Y]b'dYfgÒb`]WXYg'5bXYb_Yb'ni
Z]bXYb"'9]b'6Ygi WX']b'Y]bYa 'XYf'7UZÅg'Ui Z'XYa 'A Uf_hd`Uhn']gh
XUg'dYfZY_hY'9f`YVb]gž'i a 'g]WX'VY]'Y]bYf'HUggY'?UZZYY'i bX'Y]bYa
GhØW_'?i WXYb'ni 'YbhgdUbbYb'i bX'XUg'HfY]VYb'Ui Z'XYa 'D`Uhn'ni
VYcVUWXhYb"

: Øf; YgWk]Wkhg]bhYfYgg]YfhYi]gh'Ui WkiXYf'< YI Ybd`Uhn'Y]bYb6Ygi Wkik Yfh" <]Yf'VYZ]bXYbig]Wki ≠ Zcfa Uh]cbghUZY`bž'X]YiX]YibgWkÒbY; YgWk]WkhYiXYf'< YI Ybj YfZc`[ib[i]bi7cYgZY`Xh\YaUh]g]YfYb"'9gi]gh'Y]b'Cfh'XYg'; YXYb_Ybg'ibX'XYf'FYZ'YI]cbžXYf'X]Y'JYf[Ub[Yb\Y]h'XYf'GhUXhigdUbbYbX'UiZVYfY]hYh"

GY\Ybgk ØfX][_Y]h	6YgWXfY]Vib[² ZZbi b[gnY]hYb
Gh"!@Ua VYfh]!?]fWXY	; ch]gW\Y`?]fW\Y`a]h	A c!Gc.'\$\$' '%+.\$\$
	VYY]bXfi W_YbXYf	l ∖f
	5fWX]hY_hif	
GhUXha i gYi a	; YgWX]WXhY'i bX	8]!Gc.'%\$.\$\$' '%*.\$\$
7cYgZY`X	?i`hif'XYf'GhUXh	l ∖f
A Uf_hd`Uhn	NYbhfU`Yf'D`Uhn'a]h	² ZZYbh`]W
	AÀf_hYb'ibX	ni [Àb[`]WX
	JYfUbghU`hib[Yb	

8]Y'?ca V]bUh]cb'Ui g'; YgW\]W\hYž'?i `hi f'i bX'`YVYbX][Ya GhUXh`YVYb'a UW\h'X]Y'5`hghUXh'j cb'7cYgZY`X'ni 'Y]bYa VYqcbXYfYb'Cfh"'<]Yf'[]Vh'Yq']a a Yf'Yhk Uq'BYi Yq'ni 'YbhXYW Ybž cV'VY]'Y]bYa '[Ya Øh`]W\Yb'GdUn]Yf[Ub['cXYf'VY]'XYf'HY]`bU\a Y Ub'Y]bYa 'XYf'nU\`fY]W\Yb'JYfUbghU`hi b[Yb"'9]b'6Ygi W\']b 7cYgZY`X']gh'b]W\h'bi f'Y]b'5i gZi [']b'X]Y'JYf[Ub[Yb\Y]hž'gcbXYfb Ui W\'Y]bY'A Ò[`]W_Y]hž'g]W\'a]h'XYf'`YVYbX][Yb'; Y[Ybk Ufh'XYf GhUXh'j YfhfUi h'ni 'a UW\Yb"

?i`]bUf]gWXY; YbØggY``8]Y`VYghYb FYghUi fUbhg'i bX`7UZÅg`]b`XYf`FY[]cb

7 c Y g Z Y`X '] g h 'b] W h 'b i f 'Z Ø f 'g Y] b Y 'W U fa U b h Y '5 `hghU X h 'i b X 'g Y] b Y _ i `h i f Y ``Y b 'G Y \ Y b g k Ø f X] [_Y] h Y b 'V Y _ U b b h ž g c b X Y f b 'U i W 'Z Ø f 'X] Y j] Y `Z À `h] [Y '; Ughf c b ca] Y ž 'X] Y 'Y g 'n i 'V] Y h Y b '\ U h " <] Y f 'Z] b X Y b : Y] b g W X a Y W _ Y f 'Y] b Y 'V i b h Y 'D U `Y h h Y 'U b 'F Y g h U i f U b h g 'i b X '7 U Z Å g ž 'X] Y h f U X] h] c b Y ``Y 'k Y g h Z À `] g W X Y '? Ø W X Y 'g c k] Y '] b h Y f b U h] c b U `Y G d Y n] U `] h À h Y b 'g Y f j] Y f Y b " '9 [U `ž c V 'G] Y 'Y] b '\ Y f n \ U Z h Y g : f Ø \ g h Ø W _ ž Y] b '[Y a Ø h `] W Y g 'A] h h U [Y g g Y b 'c X Y f 'Y] b 'f ca U b h] g W Y g 'S V Y b X Y g g Y b d `U b Y b ž X] Y 'F Y [] c b '\ À `h Z Ø f 'Y X Y b '; U i a Y b 'Y h k U g 'V Y f Y] h "

HfUX]h]cbY``Y k YghZÀ`]gWXY ? ØWXY

9]b'6Ygi W\']b'7cYgZY`X'k ÀfY'b]W\hij c``gh\bX]['c\bY'XYb'; Ybi gg XYf'k YghZ\\`]gW\Yb'GdY]gYb'''\\\b'j]Y`Yb'FYghUi fUbhg'XYf'GhUXh \UVYb'G]Y'X]Y'A $O[`]WX_Y]hz'fY[]cbU`Y'?Ogh`]WX_Y]hYb'ni''dfcV]YfYb.$

- K YghZÀ`]gWXYf'GWX]b_Yb.'8]YgYf'\Yfn\UZhY'DfcgW]i hhc]gh'Y]b'YWXhYf'?`Ugq]_Yf"
- fØb_c\``a]h'D]b_Y`. '9]b'k]bhYf`]W\Yg'; Yf]W\hž'XUg
 b]W\h'ZY\`Yb'XUfZ"
- F]bXYffci`UXY. CZh`gYfj]Yfh`a]h`Fch_c\``ibX`?`Ò»Ybž`Y]bkU\fYf`; Ybigg°

8]Y'@c_U`]hÀh' *K YghZ*À`]gWXY'Ghi VY 'V]YhYh'Y]b'i a ZUb[fY]WXYg A YbØž'XUg'X]Y'5fca Yb'XYf'FY[]cb'dYfZY_h'Y]bZÀb[h''8]Y [Ya Øh`]WXY'5ha cgd\ÀfY'i bX'X]Y'\Yfn`]WXY'; UghZfYi bXgWXUZh a UWXYb'Yg'ni a ']XYU`Yb'Cfhž'i a ']b'X]Y'`c_U`Y'?i `hi f Y]bni hUi WXYb"

=bhYfbUh]cbU`Y ? ØWXY

 $: \varnothing f `X] Y ` @] Y V \setminus U V Y f `] b h Y f b U h] c b U `Y f `? \varnothing W Y `g] b X `X] Y `5 i g k U \ ``i b X E i U `] h A h `X Y f `F Y g h U i f U b h g `] b `7 c Y g Z Y `X `V Y Y] b X f i <math>W_Y b X'' `C V$] h U `] Y b] g W X Z `U g] U h] g W X `c X Y f `[f] Y W] g W X `\] Y f `Z] b X Y b `G] Y .

- @U'8c`WY'J]hU .'9]b']hU`]Yb]gW\Yg'FYghUi fUbhž'XUg'ZØf gY]bY'\Ui g[Ya UW\hY'DUghU'VY_Ubbh']gh"
- Gig\]`]a `DUf_ .`: f]gW\Yg`Gig\]`i bX`Ug]Uh]gW\Y`HUdUg]b`a cXYfbYa `5a V]YbhY"
- < Y``Ug . ; f]YW\]gW\Y'GdYn]U`]h\AhYb'a]h'Y]bYf'gW\\ObYb 5i gk U\``Ub'K Y]bYb"

8]YgY'_i`]bUf]gW\Yb'J]Y`ZU`h'V]YhYh'Y]bY'hc``Y'A Ò[`]W_Y]hž'Ui W\UbXYfY'; YgW\a ÀW_Yf'ni 'YbhXYW_Ybž'k Ybb'a Ub'NY]h']b'7cYgZY`X j YfVf]b[h"

7UZÅg ZØf XYb dYfZY_hYb ? UZZYY[Ybi gg

- 7 UZÅ '6`i a . '6YfØ\a h'ZØf'gY]bY'\Ui g[Ya UW\hYb'HcfhYb i bX'X]Y'[Ya Øh`]W\Y'5ha cgd\ÀfY"
- ? UZZYY_cgh . '9]b'\Yfj cffU[YbXYf'Cfhži a 'Y]bY 5i gk U\`'Ub'\cWkYfh][Yb'? UZZYYgdYn]U`]hÀhYb'ni [Yb]Y»Yb"
- ? UZZY_i `hi f . '9]b a]b]a U`]gh]gW\Yg'7UZ\^a]h'Y]bYf [fc>Yb'5i gk U\`'Ub'j Y[UbYb'Cdh]cbYb"

XYg'X]YgYf'7UZÅg'\Uh'gY]bYb'Y][YbYb'7\Ufa Y'i bX'`ÀXh'XUni
Y]bž'X]Y'5ha cgd\ÀfY'j cb'7cYgZY`X'ni '[Yb]Y»Yb"'CV'ZØf'Y]b
gW\bY``Yg': fØ\ghØW_ž'Y]bY'YbhgdUbbhY'?UZZYYdUi gY'cXYf'Y]b
]bZcfa Y``Yg'HfYZZYb'a]h': fYi bXYb' 'X]Y'?UZZYY_i `hi f'\]Yf']gh
`YVYbX]['i bX'\Yfn`]W\"

8]Y'VYghYb'D`ÀhnY'ZØf'Y]b'Uig[YXY\bhYg 5VYbXYggYb

K Ybb 'XYf'5VYbX'bU\hz'k]fX'Yg'NY]hz'Y]b 'gW. ObYg'F YghUi fUbh'ZØf Y]b 'Ui g[YXY\bhYg'5VYbXYggYb 'Ui gni k À\`Yb"'8]Y 'F YghUi fUbhg']b 7cYgZY`X'V]YhYb'b]W\h'bi f'Y]bY'J]Y`nU\`'Ub'A YbØgž'gcbXYfb'Ui W\UbgdfYW\YbXY'\DYb!'i bX'5i » YbVYfY]W\Yz'X]Y'Y]bYb Ub[YbY\a Yb'FU\a Yb'gW\UZZYb"

FYghUi fUbh	6YgcbXYf\Y]h	9a dZc\`YbY
		; Yf]WXhY
GhUXhd Uf_!	6Y`]YVhY'HYffUggY	F]bXYfZ]`Yhž
FYghUi fUbh		GdUf[Y`f]gchhc
6]ghfc'Ua'A Uf_h	FY[]cbU`Y`GdY]gYb	? Ufhc ZZY`gU`Uhž
		A ØbghYf`ÀbXYf
		Nk]YVY`_i W\Yb
:]g\Yfa Ub g'K \UfZ	:]gWX gd Y n]U`]hÀ hY b	; Y[f]``hY'8cfUXYž'AY
		YfYgZfØW\hY!
		J Uf]Uh]cbYb

 $\fi b X \fi b X \fi$

GU]gcbU`Y'? Ògh`]WX_Y]hYb'i bX'A Àf_hY

7 c Y g Z Y `X `\ Uh `Ui W\ `Y] b Y `J] Y `n U\ ``j c b `A Àf_h Y b `i b X J Y f Ub gh U`hi b [Y b ž `V Y] `X Y b Y b `G] Y `g U] g c b U`Y `D f c X i _h Y `i b X ; c i fa Y h g d Y n] U`] h À h Y b `[Y b] Y » Y b `_O b b Y b " 6 Y g c b X Y f g `] a `: f Ø\ `] b [i b X `] a `< Y f V g h `] g h `X Y f `G h U X ha Uf_h ž `X Y f `f Y [Y `a À »] [`g h Uh h Z] b X Y h ž `Y] b @Y V Y b g f U i a `Z Ø f ``c_U`Y `5 b V] Y h Y f ž `X] Y `Z f] g W Y g `C V g h ž ; Y a Ø g Y ž < Ub X k Y f _g d f c X i _h Y `i b X `8 Y `] _Uh Y g g Y b `Ub V] Y h Y b " `8] Y g Y `A À f _h Y Z O f X Y f b `b] W h `b i f `X] Y ``c_U`Y `K] f h g W U Z h ž `g c b X Y f b `U i W `X] Y ; Y a Y] b g W U Z h "

9]b'k Y]hYfYg'<][\`][\h']gh'XUg''À\f`]W\Y' K Y]bZYgh ž'k c'G]Y Yf`YgYbY'K Y]bY'Ui g'XYf'FY[]cb'i bX'Ui g'\cW\k Yfh][Yb 5bVUi [YV]YhYb'[Yb]Yy'b'_ObbYb"'; Y`Y[Yb\Y]h'ni 'GW\`Ya a Yb

8]Y '_i `]bUf]gWX Y 'GnYbY ']b '7 c YgZY `X ']gh 'gck c \ ` 'j]Y `ZÀ `h]['U `g 'Ui WX Y]b `UXYb X ž i b X 'Yg '[]Vh ']a a Yf 'Yhk Ug 'B Yi Yg 'ni 'Ybh XY W_Yb " 'D `Ub Yb G]Y 'U `gc 'N Y]h 'Y]b ž i a 'X]Y '; Ughfc! < c hgd c hg 'X Yf 'F Y[]cb 'ni 'Yf_i b XYb 'i b X 'g]WX 'j cb 'X Yb '5 fca Yb 'j Yf ZØ\ f Yb 'ni '`UggYb '' 9 f Zf Yi Yb 'G]Y 'g]WX 'Ub 'X Yb '? Ògh `]WX _Y]h Yb ž X]Y 'X]Y g Y 'WX Ufa Ub h Y GhUXh 'ni 'V]Yh Yb '\ Uh ž i b X ``UggYb 'G]Y 'g]WX 'j cb 'X Yf ; Ugh Zf Yi b X g WX U Zh X Yf '` 7 c Y g Z Y `X Y f 'V Y[Y]gh Y fb "

BUhi f'di f' '8]Y'gW\ ÒbghYb'K UbXYf!'i bX FUXk Y[Y'fi bX'i a '7cYgZY`X

7cYgZY`X`]ghij cb`Y]bYf`UhYa VYfUi VYbXYb`BUhi fi a [YVYbž:X]Y XUg`< Yfn`Y]bYg`YXYb`BUhi fZfYi bXYg`\Ò\YfgW\`U[Yb``Àggh"`8]Y FY[]cb`V]YhYhY]bY`J]Y`nU\``Ub`K UbXYf!`i bX`FUXk Y[Ybž:X]Y gck c\``ZØf`; Y`Y[Yb\Y]hgk UbXYfYf`U`g`Ui W\`ZØf`YfZU\fYbY`Gdcfh`Yf[YY][bYhg]bX"`<]Yf`g]bX`Y]b][Y`XYf`VYghYb`Fci hYbž`X]Y`Xi i bVYX]b[h`Yf_i bXYb`gc``hYgh"

K UbXYfk Y[Y'ZØf'^YXY'Ghi ZY

8]Y'K UbXYfk Y[Y'fi bX'i a '7cYgZY`X'g]bX'\Yfj cffU[YbX'a Uf_]Yfh i bX'V]YhYb'a U`Yf]gW\Y'5i gV`]W_Y'Ui Z'X]Y'hmd]gW\Y a ØbghYf`ÀbX]gW\Y'@UbXgW\UZh"8i '_Ubbgh'Xi fW\'k Y]hY'K]YgYbž X]W\hY'K À`XYf'i bX'Ybh`Ub['fi \][Yf': `ØggY'k UbXYfb"'Ni 'XYb VY`]YVhYghYb'K UbXYfk Y[Yb'[Y\ÒfYb.

- 8Yf'7cYgZY`XYf'K U`XkY[.'9]b'FibXkY['jcb'YhkU'%\$
 _a ž']XYU`'ZØf': Ua]`]Yb'ibX'`Y]W\h'ni 'VYk À`h][Yb"'8Yf'K Y[
 ZØ\fh'XifW\XYb'gW\ÒbYb'7cYgZY`XYf'K U`X'ibX'V]YhYh
 nU\`fY]W\Y'Fi\Yd`ÀhnY"
- 8 Y f '9a gk Ub X Y fk Y [. '9]b 'HY] `ghØW_ 'X Y g 'ØV Y ffY []cbU`Yb 9a gk Ub X Y fk Y [Y gž'X Ug 'V Y Y]b X fi W_Y b X Y '5 i gV`]W_Y 'Ui Z'X]Y 9a g'i b X ']\ fY '5 i Y b `Ub X g W U Z h Y b 'V]Y h Y h "
- 8 Y f '9[[Y f]b[\ Ui gY f 'K Y[. '9]b 'b Uhi f V Y `UggY b Y f F i b X k Y [ž'XY f 'X]Y 'K Ub XY f Y f 'X i f W 'j Y f g W]Y XY b Y @Ub X g W U Zhghmd Y b 'ZØ\ fh i b X 'c d h a U` 'ZØ f 'a]h h Y `a À »][Y

FUXZU\fYb]b XYf I a [YVi b[

7cYgZY`X`]gh'Ui W\`U`g`FUXZU\fXYgh]bUh]cb`VY_Ubbhž'a]h'Y]bYf J]Y`nU\``j cb`FUXkY[Ybž'X]Y`gckc\``ZØfYbhgdUbbhY`5i gZ`Ø[Y'U`g Ui W\`ZØf`gdcfh`]W\Y`<YfUi gZcfXYfi b[Yb`[YY][bYh'g]bX"`6YgcbXYfg Ya dZY\`YbgkYfh'g]bX.

- 8 Yf'F UXk Y['A ØbghYf`UbX.'9]b'[i h'Ui g[YVUi hYf'i bX Ui g[YgW\]`XYfhYf'F UXk Y[ž'XYf'ØVYf'%"\$\$\$'_a 'i a ZUggh i bX'Xi fW\'a U`Yf]gW\Y'8 OfZYf'i bX': Y`XYf'ZØ\fh"
- 8 Yf'7cYgZY`XYf'Fci hY.'9]bY'?i fnghfYW_Y'j cb'Yhk U'&\$
 _a ž'X]Y'Xi fW\'X]Y'[fØbY'l a [YVi b['j cb'7cYgZY`X'ZØ\fh
 i bX'Yg'FUXZU\fYfb'Yfa Ò[`]W\hž'fY[]cbU`Y
 GY\Ybgk ØfX][_Y]hYb'ni 'YbhXYW_Yb"
- 8 Y f '9a g! F U X k Y [. '9]b 'U V k Y W g`i b [gfY] W Y f 'F U X k Y [Y b h`U b ['X Y f '9a gž'] X Y U ` 'ZØf' Y]b 'D] W b] W 'U a ': `i ggi Z Y f "

BUhi fYf`YVb]ggY`ZØf`U``Y`G]bbY

8]Y'BUhi f`fi bX'i a '7cYgZY`X']gh'b]W\h'bi f`ni a 'K UbXYfb'i bXFUXZU\fYb'[YY][bYh"'J]Y`Y'K Y[Y'ZØ\fYb'ni 'VYgcbXYfYbBUhi fYf`YVb]ggYbž'X]Y'XY]bY'G]bbY'UbgdfYW\Yb.

- K]`Xh]YfVYcVUW hi b[. '< U`hY'5i ggW Ui 'bUW Y]b\Y]a]gW Yb'J Ò[Y`b'i bX'H]YfYb'Ybh`Ub['XYf'K Y[Y" 6YgcbXYfg'XYf'7cYgZY`XYf'K U`X']gh'Y]b'VY`]YVhYf'Cfh'ZØf K]`Xh]YfVYcVUW hi b[Yb"
- 6chUb]gWXY'9bhXYW_i b[gfY]gY.'9f_i bXY'X]Y'j]Y`ZÀ`h][Y
 : `cfUž'X]Y'ØVYfU```V`Ø\h"'Jcb'a U`Yf]gWXYb'K]`XV`i a Yb'V]g
 \]b'ni 'Y]bXfi W_gj c``Yb'6Ui a UfhYb'[]Vh'Yg'j]Y`'ni
 YbhXYW_Yb"
- : chcgdchg. 'D`UbY'Y]bYb'Ghcdd'Ub'XYb'gWX ObghYb
 5i gg]WXhgdi b_hYb'ZØf'Y]b][Y'hc``Y'GWXbUddgWX ØggY"'8]Y
 GcbbYbi bhYf[Ab[Y'ØVYf'XYb': Y`XYfb'g]bX'VYgcbXYfg
 UhYa VYfUi VYbX"

=bZfUghfi _hi f'i bX'5i gfØghi b[

8]Y'; Y[YbX'i a '7cYgZY`X']gh'[i h'YffY]W\VUfž'i bX'Yg'[]Vh nU\`fY]W\Y'A Ò[`]W_Y]hYbž'XUg'f]W\h][Y'9ei]da Ybh'ni '`Y]\Yb'cXYf ni '_Ui ZYbž'k Ybb'Xi 'XY]b'Y][YbYg'b]W\h'a]hVf]b[Yb'_Ubbgh''<]Yf g]bX'Y]b][Y'9a dZY\`i b[Yb.

Gdcfh[YgWXÀZh	5 X f Y g g Y	HY`YZcbbi a a Yf
Gdcfh'A Ø``Yf	< Ui dhghfU» Y '%&ž	\$&) (%'%&' () *
	7 c Y g ZY `X	
FUXk Y`h'7cYgZY`X	6U\b\cZghfU»Y''(ž	\$&) (%'*) (' &%
	7 c Y g ZY `X	
Ci hXccf ⁻ G\cd	Di `j Yfhi fa ghfU» Yʻ, ž	\$&) (%'-,+*) (
7 c Y g ZY `X	7 c Y gZY `X	

H]ddg ZØf XYb dYfZY_hYb HU[]b XYf B Uhi f

I a 'XY]bY'HU[Y']b'XYf'BUhi f'fi bX'i a '7cYgZY`X'bcW\'gW\ÒbYf'ni [YghU`hYbž'\]Yf'Y]b'dUUf'dfU_h]gW\Y'H]ddg.

- : fØ\ 'ghUfhYb.'8]Y 'VYghYb'@UbXgW\UZhYb'nY][h'X]Y 'BUhi f Ua 'Acf[Yb"'5i »YfXYa 'j Yfa Y]XYgh'Xi 'X]Y'<]hnY'i bX'XYb hci f]gh]gW\Yb'5bghi fa "
- @c_U`Y`@YVYbga]hhY``a]hVf]b[Yb.`DUW_Y`Y]b`D]W_b]W_ a]h`fY[]cbU`Yb`GdYn]U`]hÀhYb`Y]b` `XUg`a UW\h`X]Y`5i gnY]h]b`XYf`BUhi f`bcW\`[Ybi ggj c``Yf"
- BUWW\U`h][_Y]h. '5 WW hY 'Ui Z'X]Y 'I a k Y`hž']bXYa 'Xi 'XY]bYb
 A Ø```a]hb]a a gh'i bX'X]Y 'K Y[Y'b]WW h'j Yf`Àggh" 'Gc 'V`Y]Vgh
 Xi ']a '9]b_`Ub['a]h'XYf'BUhi f"

G]bX'XY]bY'K UbXYfgWki \Y'[YgWkbØfh3'6YfY]hž'X]Y'FUXk Y[Y'ni Yf_i bXYb3'8]Y'bUhØf`]WkY'GWkÒb\Y]h'XYf'I a [YVi b['j cb'7cYgZY`X `Aggh'g]Wk'Ua 'VYghYb'a]h'Y][YbYb'5i [Yb'Yf`YVYb'''5`gc'gWkbUdd X]f'XY]bY': Ua]`]Y'cXYf': fYi bXY'i bX'YbhXYW_Y'X]Y'[fØbYb'CUgYbž X]Y'X]YgY'FY[]cb'ni 'V]YhYb'\Uh'''9[U`ž'cV'Xi 'Ui Z'XYf'Gi WkY'bUWk 9bhgdUbbi b['cXYf'gdcfh']WkYf'6YhÀh][i b['V]ghž'7cYgZY`X'\Uh'ZØf YXYb'Yhk Ug']a '5b[YVch'

?i`hi f'i bX'HfUX]h]cb' :: YghY'i bX J YfUbghU`hi b[Ybž'X]Y'a Ub'b]WX h'j YfdUggYb gc``hY

- 7cYgZY`XYf'GhUXhZYgh. '8]YgYg': Ygh'Z]bXYh'YXYg'&J\f']a GYdhYa VYf'ghUhh'i bX'j Yfk UbXY`h'X]Y'5`hghUXh']b'Y]b 'YVYbX][Yg'NYbhfi a 'j c``Yf'A i g]_ž'HUbn'i bX'_i `]bUf]gWXYb ; YbØggYb"'@c_U`Y'6UbXg'i bX'? Øbgh`Yf'hfYhYb'Ui Zž k À\fYbX'< ÀbX`Yf']\fY'K UfYb'UbV]YhYbž'j cb ?i bgh\UbXk Yf_'V]g'ni 'fY[]cbU`Yb'GdYn]U`]hÀhYb"
- A Ufh]bgi a ni [. '8 Yf 'A Ufh]bgi a ni [']gh'Y]bY'[Y`]YVhY

 HfUX]h]cbž'X]Y'A\f`]W\]a 'Bcj Ya VYf'[YZY]Yfh'k]fX"'?]bXYf

 n]Y\Yb'a]h'@UhYfbYb'Xi fW\'X]Y'GhfU» Yb'i bX'g]b[Yb

 @]YXYfž'i a 'Ub'X]Y'@Y[YbXY'XYg'\Y]`][Yb'A Ufh]b'ni

 Yf]bbYfb"'8 Ug': Ygh'gma Vc`]g]Yfh'@]W\h']b'XYf'8i b_Y`\Y]h

 i bX'X]Y'<]`ZqVYfY]hgW\UZh'ZØf'X]Y'6YXØfZh][Yb"
- K Y]\ bUWX hga Uf_h. *\dot XYf 5Xj YbhgnY]hij Yfk UbXY`hig]WX 7cYgZY`X`]b Y]b K]bhYfk i bXYf`UbX" 8Yf K Y]\ bUWX hga Uf_h V]YhYhY]bY J]Y`nU\``j cb GhAbXYbž Ub XYbYb \UbX[YZYfh][hY'; YgWXYb_Yž K Y]\ bUWX hgXY_c i bX _\Ogh`]WXY @Y W_YfY]Yb j Yf_Ui Zh k YfXYb"; `Ø\ k Y]b i bX Zf]gWX [YVfUbbhY A UbXY`b 'gcf[Yb 'ZØf 'ZYgh`]WXY Gh]a a i b["
- 7 c Y g ZY `X g `G W Øhn Y b ZY gh. '8] Y g Y g `hf U X] h] c b Y ``Y ': Y g h ž X U g] b `X Y f `F Y [Y ``] a `G c a a Y f `[Y ZY] Y f h `k] f X ž `] g h Y] b `< Ò \ Y d i b _ h] b `X Y f `G h U X h " ` 9 g `[] V h `D U f U X Y b ž `G W] Y » k Y h h V Y k Y f V Y `i b X n U \ `f Y] W X Y `5 _h] j] h À h Y b `ZØ f `X] Y `[U b n Y : U a] `] Y " 8] Y G W Øhn Y b V f i X Y f g W U Z h Y b `U i g `X Y f I a [Y V i b ['b Y \ a Y b X U f U b `h Y] `ž i b X `X] Y `[U b n Y `G h U X h `Z Y] Y f h `n i g U a a Y b "</p>

- 7cYgZY`XYf'?]fa Yg. *XYYg'*J\f']a '5i [i gh'Z]bXYh'X]Y ?]fa Yg'ghUhhž'Y]b'VY`]YVhYg'Jc`_gZYgh'a]h': U\f[YgW\AZhYbž Gd]Y`Vi XYb'i bX'UbXYfYb'5hhfU_h]cbYb"'8]Y'?]fa Yg'n]Y\h nU\`fY]W\Y'6Ygi W\Yf'Ubž'X]Y'Gd]Y`Y'gd]Y`Ybž'YggYb'i bX bYi Y'6Y_UbbhgW\UZhYb'qW\`]Y»Yb'a ÒW\hYb"
- HU['XYg'cZZYbYb'8Yb_a U`g. =a 'GYdhYa VYf'[]Vh'Yg nU\`fY]W\Y': Ø\fi b[Ybž'VY]'XYbYb'X]Y'\]ghcf]gW\Yb; YVÀi XY'i bX'8Yb_a À`Yf'j cb'7cYgZY`X'j cf[YghY``h k YfXYb"'5b'X]YgYa 'HU['\UVYb'6Ygi W\Yf'X]Y'A Ò[`]W_Y]hž a Y\f'ØVYf'X]Y']bhYfYggUbhY'; YgW\]W\hY'XYf'GhUXh'ni YfZU\fYb'i bX']\fY'5fW\]hY_hi f'ni 'VYk i bXYfb"

9]bY'k Y]hYfY'VYa Yf_Ybgk YfhY'J YfUbghU'hi b[']gh'XUg'7cYgZY`XYf:]`a ZYgh]j U`ž'XUg'g]W\'ni bY\a YbX'U`g'_i `hi fY``Yf'<Ò\Ydi b_h YhUV`]Yfh"'\dolday XYf'FY[Y`']a ': fØ\'U\f'Ui g[Yf]W\'hYhž'k YfXYb nU\`fY]W\Y'?i fnZ]`a Y'i bX'8c_i a YbhUh]cbYb'[YnY][hž'j]Y`Y'j cb `c_U`Yb':]`a Ya UW\Yfb'dfcXi n]Yfh''K cf_g\cdg'i bX DcX]i a gX]g_i gg]cbYb'Yf[ÀbnYb'XUg'Dfc[fUa a 'i bX'V]YhYb\dolday hYfYgg]YfhYb'X]Y'A Ò[`]W_Y]hž']b'X]Y'K Y`h'XYg':]`a g

9]b [Ubn gdYn]Y ``Yg '9fY][b]g 'Z]b XYh ']a 'A U] 'ghUhh '8 Yf '7 c YgZY `XYf 6`i a YbgW a i W_!K YhhVYk YfV "'8]Y 'GhUXh 'k]fX 'XUbb ']b 'Y]b 6`i a Yba YYf 'j Yfk UbXY hž k c VY] 'X]Y '6Øf[Yf 'Y]b `UXYbž ']\ fY '; ÀfhYb i bX : YbghYf 'ni 'gW a ØW_Yb "'9]bY '¾ fm VYk YfhYh 'X]Y '_fYUh]j ghYb i bX '[YgW a UW_j c ``ghYb '8 Y_cfUh]cbYbž i bX 'X]Y ; Yk]bbYf 'k YfXYb a]h DfY]gYb 'Ui g[YnY]W bYh" '8]Yg 'ZÔfXYfh 'b]W h 'bi f 'XYb ; Ya Y]bgW UZh ji f ; Y`hi b["

8]Y: fYU_m: f]XUmJYfUbghU`hi b[Yb'g]bX'Y]b'k Y]hYfYg'6Y]gd]Y`ZØf'X]Y'`YVYbX][Y'?i `hi fgnYbY']b'7cYgZY`X"'5b'Ui g[Yk À\`hYb:fY]hU[Yb']a '\\f'k YfXYb']b'j YfgW\]YXYbYb'?bY]dYb'i bX'7UZÅgXYg'GhUXhnYbhfi a g'@j Y!A i g]_!9j Ybhg'cf[Ub]g]Yfhž'X]Y'ZØf'YXYb; YgW\a U_Yhk Ug'ni 'V]YhYb'\UVYb' 'j cb'Fc_a i g]_'V]g'\]b'ni \\\Jnn!5VYbXYb"

 $\label{eq:continuous} I a \ X]Y \ VYghYb \ J \ YfUbghU \ hi \ b[\ Yb \]a \ 6`]W \ ni \ VY \ U \ hYb \ ZYa \ d \ ZY \ Yb$

 $k \]f\check{z}'X]Y'K \ YVgY]hY'XYf'GhUXh'7cYgZY`X'ni 'VYgi W\Yb''8cfh'Z]bXYb \\ G]Y'Y]bYb'J YfUbghU`hi b[g_U`YbXYf\check{z}'XYf' \Rightarrow bYb'\]`Zh\check{z}' \Rightarrow fY'FY]gY \\ cdh]a U`ni 'd`UbYb'i bX'_Y]bY'XYf'gdUbbYbXYb'5_h]j]hÀhYb'ni j YfdUggYb''$

JYfUbghU`hi b[AcbUh	6YgcbXYf\Y]hYb
GhUX hZY gh	GYdhYa VYf	@j Y!A i g]_ž
		fY[]cbU`Y`DfcXi_hY
A Ufh]bgi a ni [Bcj Ya VYf	@UhYfbYbiani[ž
		; YgUb[
K Y]\bUW\hga Uf_h	8YnYa VYf	; `Ø\kY]bž
		\UbX[Ya UWXhYg
		?i bgh\UbXk Yf_
GWX ØhnY b ZY gh	Gca a Yf	DUfUXYž
		GWW.]Y»kYhhVYkYfVY
?]fa Yg	5i[igh	: U\f[YgW\ÀZhYž
		Gd]Y`Vi XYb
HU['XYg'cZZYbYb	GYdhYa VYf	:Ø∖fi b[Ybž
8 Y b_a U`g		\]ghcf]g\\Y'9]bV`]_Y
7cYgZY`XYf'6`i a Ybg	A U]	; YghU`hi b[ž
WkaiW_!KYhhVYkYfV		DfÀa]Yfi b[Yb
: fYU_m': f]XUm	J Uf]UVY`	@j Y!A i g]_ž
		j YfgWX]YXYbY
		; YbfYg

8]Y'_i`hi fY``Yb'JYfUbghU`hi b[Yb']b'7cYgZY`X'g]bX'Y]b'k]Wkh][Yf 6YghUbXhY]`'XYg'@YVYbg']b'X]YgYf'a U`Yf]gWkYb'GhUXh'''G]Y'V]YhYb Y]bY'\Yfj cffU[YbXY'; Y`Y[Yb\Y]hž'X]Y'\Yfn`]WkY'; UghZfYi bXgWkUZh XYf'7cYgZY`XYf'_YbbYbni `YfbYb'i bX'g]Wk'a]h'XYf'`c_U`Yb'?i `hi f Ui gY]bUbXYfni gYhnYb'''@UggYb'G]Y'g]Wk'j cb'XYf'J]Y`ZU`h'i bX'XYf 6Y[Y]ghYfi b['XYf'A YbgWkYb'j cf'Cfh'UbghYW_Yb'i bX'[Yb]Y»Yb'G]Y X]Y'`YVYbX][Y'5ha cgd\ÀfYž'X]Y''YXY'JYfUbghU`hi b['ni 'Y]bYa Y]bn][Ufh][Yb'9f`YVb]g'a UWkh"

: Ua]`]YbZfYi bX`]W\Y'5_h]j]hÀhYb' 'Gd]Y`'i bX GdU» 'ZØf'; fc» 'i bX'? `Y]b

 $7\,c\,Y\,g\,Z\!Y\,`X\,`]gh\,`b\,]W\!\lambda\,h'b\,i\,f\,`Y\,]b\,`C\,fh\,`Z\!\emptyset f\,';\,\,\,Y\,g\,W\!\lambda\,]W\!\lambda\,hg\,!\,\,`i\,\,b\,X$

?i`hi f]bhYfYgg]YfhYžgcbXYfb'Ui W\'Y]b'k U\fYg'DUfUX]Yg'ZØf
: Ua]`]Yb"'8]Y'GhUXh'i bX'X]Y'i a `]Y[YbXYb'FY[]cbYb'V]YhYb'Y]bY
J]Y`nU\`'Ub': fY]nY]ha Ò[`]W_Y]hYbž'X]Y'gck c\`'ZØf'?]bXYf'U`g'Ui W\
ZØf'9fk UW\gYbY'[YY][bYh'g]bX"'Jcb']bhYfU_h]j Yb'A i gYYb'V]g'\]b
ni 'gdUbbYbXYb'Ci hXccf!5_h]j]hÀhYb'[]Vh'Yg']b'7cYgZY`X'j]Y``ni
YbhXYW_Yb"

9]b 'UVgc `i hYg' <][\ `][\ h'ZØf': Ua]`]Yb ']gh'XYf'GhUX hd Uf_
7 c YgZY `X"'8]YgYf'[fc » nØ[][Y'DUf_ '`ÀXh'ni 'Yb hgd Ub bYb XYb
Gd Un]Yf[Àb [Yb 'i b X'D]W_b]W_g'Y]b "'8]Y'?]bXYf'_Òb bYb 'g]WX 'Ui Z
XYa '[fc » Yb 'Gd]Y `d `Uhn'a]h'gWX Ui _Y`b XYb ž'fi hgWX Yb XYb 'i b X
_ `YhhYfb XYb '5 VYb hYi Yfb 'j Yf[bØ[Yb ž'k À\ fYb X'X]Y'9 `hYfb ']b 'XYf
BÀ\Y'Yb hgd Ub bYb "'6 Ygc b XYfg']a 'Gc a a Yf'Z]b XYb ']a 'GhUX hd Uf_
c Zh'J Yf Ub ghU `hi b[Yb 'k]Y': fY]`i Zh_c b nYfhY 'c XYf': Ua]`]Yb ZYghY
ghUhh"

: Øf`X]Y`_`Y]bYb`9bhXYW_Yf`]gh`XUg`K U`Xgd]Y`[Y`ÀbXY`Y]b`Aigg" <]Yf`_ÒbbYb`X]Y`?]bXYf`]b`Y]bYa`[YgW.ØhnhYb`5fYU``X]Y`BUhif Yf_i bXYbž`Ui Z`6Ui a ghÀa a Yb`VU`UbW]YfYbž`]a `GUbX`Vi XXY`b`i bXg]W\`a]h`UbXYfYb`?]bXYfb`Ui ghcVYb"`8Ug`I a ZY`X`]gh`g]W\Yf`i bXV]YhYh`[Ybi [`D`Uhn`ZØf`_fYUh]j Y`Gd]Y`Y"`8]Y`BUhif`gd]Y`h`\]YfY]bYnYbhfU`Y`Fc``Yž`k Ug`X]Y`?`Y]bYb`XUni `UbfY[hž`X]Y`I a k Y`h`nigW\AhnYb`i bX`ni `fYqdY_h]YfYb"

9]bik Y]hYfYfiUi ZfY[YbXYfiCfhiZØfi: Ua]i]Ybi]ghiXYfi8Øia YbYf

K]iXdUf_žiXYfig]Wi]biXYfiBÀ\Yijcbi7cYgZYiXiVYZ]bXYhii8YfiDUf_
]ghi<Y]a UhiZØfij]YiYijYfgWi]YXYbYiH]YfUfhYbiibXiV]YhYhiX]Y

A Ò[i]Wi_Y]hžik]iXYiH]YfYi]bi]\fya ibUhØfi]WiYbi@YVYbgfUia ini
VYcVUWihYbii</p>
'YoybžigcbXYfbiUi Wij]Yii@VYfi]\fybi@YVYbgfUia iibXi]\fy
'YVYbžigcbXYfbiUi Wij]Yii@VYfi]\fybi@YVYbgfUia iibXi]\fy
'Ykc\b\Y]hYbiiYfbYbii9]bi6Ygi WijaiK]iXdUf_i]ghigca]hib]WihbifibhYf\UihgUa žigcbXYfbiUi WiiY\ffY]Wii

GUa a `i b['j cb'?]bXYfVØW\Yfbž'7ca]Wg'i bX'Gd]Y`Ybž'X]Y'X]Y : UbhUg]Y'UbfY[Yb'i bX'X]Y'?fYUh]j]hÀh'ZÒfXYfb"

8 Ugʻ=bXccf!Gd]Y`d`Uhnʻ ? Àdh bʻ6`Ui VÀf 'V]YhYhini XYa 'YXY A Yb[Y'GdU» ž'Y[U``VY]'k Y`WXYa 'K YhhYf"'A]h'Y]bYa 'f]Yg][Yb?`YhhYf[YfØghž'Fi hgWXYbž'HfUa dc`]bYbʻi bX'Y]bYfʻJ]Y`nU\``j cbGd]Y`ghUh]cbYbʻ_ÒbbYb'X]Y'?]bXYfʻbUWX'<YfnYbg`i gh'hcVYbžk À\fYbX'X]Y'9`hYfb'g]WX'Ui Z'Y]bYfʻXYfʻ[Ya Øh`]WXYbʻ6Àb_YYbhgdUbbYbʻ_ÒbbYb"

: Øfigdcfhi]WX 'U_h]j Y': Ua]i]Yb'[]Vh'Yg'X]Y'A Ò[i]WX_Y]hž'XUg'

GWX k]a a VUX: 7UddY`Yf'Gdcfhk Y`h 'ni 'VYgi WXYb'' <]Yf
_ÒbbYb'; fc > 'i bX'? 'Y]b']a 'K UggYf'd`UbgWXYb'i bX'j YfgWX]YXYbY

K UggYfgdcfhUfhYb'Ui gdfcV]YfYb'''9g'[]Vh'6YW_Yb'ZØf'U``Y

5`hYfg[fi ddYbž'gck]Y'K UggYffi hgWXYb'ZØf'YI hfU'j]Y`'GdU>'''5i WX
?i fgY'ZØf'GWXk]a a UbZÀb[Yf'k YfXYb'Ub[YVchYbž'gcXUgg'XUg

GWXk]a a Yb`YfbYb'gd]Y`Yf]gWX'i bX'g]WXYf'[YghU`hYh'k YfXYb'_Ubb''

5_h]j]hÀh	Cfh	5`hYfgYa dZY\`i b[
$GhUXhdUf_^{7}cYgZYX$	GhUXhdUf_	5``Y'5`hYfg[fiddYb
K U`Xgd]Y`[Y`ÀbXY	6Øf[YfkU`X	5V'' '划\fYb
8Ø`a YbYf'K]`XdUf_	8Ø`a Ybž'bU\Y	5 V ˙) ˙划\fYb
	7 c Y gZY `X	
?Àdhb'6`UiVÀf	7 c Y g ZY `X	5 V · % · 划 \ f
7UddY`Yf'Gdcfhk Y`h	7cYgZY`X	5``Y'5`hYfg[fiddYb

 $\label{eq:normalizero} Ni g Ahn`]W `ni `X]Y g Y b `5 b [Y V c h Y b `c f [U b] g] Y f h `X] Y `Gh U X h `f Y [Y `a A `a] [: Ua]`]Y b Z Y g h Y `i b X `5 h] c b Y b ž `X] Y `g d Y n] Y ``` U i Z ?] b X Y f `i b X `] \ f Y : Ua]`]Y b `Ui g [Y `Y [h `g] b X " `8] Y g Y `9 j Y b hg `V] Y h Y b `Y] b Y `[i h Y $ Y `Y [Y b \ Y] h Ž `a] h `U b X Y f Y b `: Ua]`]Y b `] b `? c b h U h `ni `h f Y h Y b `i b X [Y a Y] b g U a `Y] b Y `[i h Y `N Y] h `ni `j Y f V f] b [Y b " `C Z h a U `g `k Y f X Y b `\] Y f U i W ``c _U`Y`? Ø b g h `Y f `i b X ` < U b X k Y f _Y f `Y] b [Y `U X Y b ž `X] Y `V Y g c b X Y f Y K c f _q \ c d g `Z Ø f `?] b X Y f `U b V] Y h Y b "$

A]h'U``X]YgYb'A Ò[`]W_Y]hYb']gh'7cYgZY`X'Y]bY'\Yfj cffU[YbXY K U\`ZØf'Y]bYb': Ua]`]YbUi gZi ["'8]Y'GhUXh'j YfV]bXYh'Ui Z k i bXYfVUfY'K Y]gY'6]`Xi b['i bX': fY]nY]hž'GdU» 'i bX'9bhgdUbbi b["9[U`ž'cV'G]Y'X]Y'BUhi f'[Yb]Y»Yb'cXYf']b'Y]bYa 'XYf'j]Y`Yb

gdUbbYbXYb'9]bf]W\hi b[Yb'U_h]j 'gY]b'a \grave{O} W\hYbž'7cYgZY`X'\Uh'ZØf YXY': Ua]`]Y'Yhk Ug'ni 'V]YhYb'

; Y\Y]a h]ddg'ZØf'Y]bYb'i bj Yf[Ygg`]WXYb 5i ZYbh\U`h']b'7cYgZY`X

%" $9f_i b X Y b G Y X Y J Y J Y F G A Y W_h Y b K b_Y X Y f 5 hg h U X h$

8]Y'5`hghUXh'j cb'7cYgZY`X']gh'b]W\h'bi f'\]ghcf]gW\'fY]nj c``ž gcbXYfb'Ui W\'j c``Yf'_`Y]bYfž'a U`Yf]gW\Yf'9W_Ybž'X]Y'cZh ØVYfgY\Yb'k YfXYb"'BY\a Yb'G]Y'g]W\'NY]hž'i a 'Xi fW\'X]Y'Yb[Yb; UggYb'ni 'gW\`YbXYfb'i bX'YbhXYW_Yb'G]Y.

- 8 Ugʻ6fUi \ Ui gʻ6ØW_Yfž'k cʻX]Yʻ; YgWX]WX hYʻXYfʻGhUXhʻVY]
 Y]bYa 'Zf]gWX '[YnUd ZhYbʻ6]Yf``YVYbX]['k]fX"
- 8]Y'<]bhyf\ÒZY'XYf'5`hghUXhž'X]Y'cZh'j YfghYW_hY ?ibghkYf_Y'cXYf'_`Y]bYž'[Ya Øh`]WXY'7UZÅg'VY\YfVYf[Yb"
- GWX ObYž'U`hY': UWX k Yf_\Ai gYfž'X]Y'ZØf'dYfZY_hY
 chca ch]j Y'gcf[Yb"

$\&""; Yb]Y \gg Yb G]Y X]Y B Uhi f UVgY]hg XYf VY_UbbhYb K Y[Y]$

8 Ugʻla `UbX'jcb'7cYgZY`X'\Uh'bUhØf`]W\Y'GW\Òb\Y]hYb'ni 'V]YhYbžX]Y'cZh'jcb'Hcif]ghYb'ØVYfgY\Yb'kYfXYb"'6YgiW\Yb'G]Y'X]YkYb][Yf'VY_UbbhYb'BUhiffYgYfjUhY'ibX'[Yb]Y»Yb'G]Y.

- 8]Y'Accfa YYfž'Y]b'fi\][Yf'Cfhž']XYU`nia'6YcVUW\hYb jcb'JÒ[Y`b"
- 8]Y'K UggYfgWXi hn[YV]YhY']b'XYf'l a [YVi b[ž'dYfZY_h ZØf'D]W_b]W_g'Ua 'K UggYf"
- $\bullet \ \ I \ \ b \ V \ Y f \emptyset \backslash \ f h Y \ \ `K \ \ U \ `X \ [\ Y \ V \] Y \ h Y \ \check{z}' \] b \ \ `X \ Y \ b \ Y \ b \ \ `G \] Y \ \ `U \ \ Z' \ \stackrel{}{=} \ f Y \ b$

K UbXYfi b[Yb'X]Y'Gh]``Y'[Yb]Y»Yb'_ÒbbYb"

9]b][Y'XYf'gW\ÒbghYb'9f`YVb]ggY']b'XYf'FY[]cb'`UggYb'g]W\']b'XYbbU\Y[Y`Y[YbYb'8 ÒfZYfb'Z]bXYb"'| bhYfbY\a Yb'G]Y'Y]bYbHU[YgUi gZi ['bUW\.

- ; YgWXYf` 'VYfØ\a h'ZØf'gY]bY'8fY][]YVY`\Ài gYf'i bX'XUg VY`]YVhY'Di ddYba i gYi a "
- 6cggYbXcfZ' 'ZØf'gY]bY']Xm``]gWXYb'FUXkY[Y'i bX'XUg BUhi fYf`YVb]g"
- @YhhY: 'VY_Ubbh'ZØf'X]Y'hfUX]h]cbgfY]WXY'HÒdZYfY]'ibX \UbXk Yf_`]WXY'DfcXi_h]cb"

("' $@c_U$ 'Y'A Àf_hY'i bX'J YfUbghU'hi b[Yb'VYgi WXYb

9]b'k Y]hYfYf'; Y\Y]a h]dd'ZØf'7cYgZY`X']ghž'`c_U`Y'A Àf_hY'i bX J YfUbghU`hi b[Yb'ni 'VYgi W\Yb"'8Ug'[]Vh' \Rightarrow bYb'Y]bYb Ui h\Ybh]gW\Yb'9]bV`]W_']b'XUg'@YVYb'XYf'7cYgZY`XYf.

- K cWXYba Uf_h` 'YXYb'A]hhk cWX'i bX'GUa ghU['Ui Z'XYa A Uf_hd`Uhnža]h'fY[]cbU`Yb'DfcXi_hYb'i bX'`YV\UZhYb GhÀbXYb"
- ?i bgh! i bX < UbXk Yf_Yfa Uf_h 'VY] gdYn]Y``Yb 5b`ÀggYbž'k c'⇒bYb'`c_U`Y'? Øbgh`Yf']\fY'K Yf_Y dfÀgYbh]YfYb"

) "'9]b\Y]a]gWXYGdYn]U`]hAhYb [Yb]Y» Yb

 $BYVYb`XYb`VY_UbbhYb`FYghUi~fUbhg`gc``hYb`G]Y`Ui~Wk`X]Y`_`Y]bYbž~k~Yb][~Yf`ZfYei~Ybh]YfhYb`@c_U`Y`Ui~gdfcV]YfYbž`X]Y`fY[~]cbU`Y~?~Ogh`]Wk_Y]hYb`UbV]YhYb"`DfcV]YfYb`G]Y.$

- < Y]a]gWX Y : `Y]gWX!'i bX'K i fghk UfYb']b'Y]bYa 'XYf
 _`Y]bYb'A Yhn[YfY]Ybž'k c'HfUX]h]cb'[fc»[YgWXf]YVYb'k]fX"
- FY[]cbU`Y'? AgYgcfhYb' 'XYf'? AgY`UXYb']b'7cYgZY`X']gh Y]b'Zf]YX`]WXYf'Cfhž'i a 'j YfgWX]YXYbY'GcfhYb'ni 'dfcV]YfYb"

*"'?i`hificf'Cfh' 'XUg'@YVYb'XYf'7cYgZY`XYf'Yf`YVYb

I a 'XUg'YW\hY'7cYgZY`X'ni 'gdØfYbž'gc``hYb'G]Y'Ub'Y]bYf'XYf _i `hi fY``Yb'J YfUbghU`hi b[Yb'hY]`bY\a Yb"'H]ddg'\]YfZØf'g]bX.

- 6Ygi WXYb'G]Y'Y]bY'h\YUhfU`]gWXY'5i ZZØ\fi b[']a '5`hYb FUh\Ui g'i bX'Yf`YVYb'G]Y'`c_U`Y'HU`YbhY"
- GY\Yb'G]Y'g]W\'Y]b'?cbnYfh']a '6Øf[Yf\Ui g'Ubž'k c'A i g]_ cZh'Y]bY'[fc»Y'Fc``Y'gd]Y`h"

5_h]j]hÀh	8 Y hU]`g
K cWXYba Uf_h	≯XYb^A]hhkcWX'ibX'GUaghU['
	fY[]cbU`Y`DfcXi_hYž``YV\UZhY
	5ha cgd\ÀfY
?i bgha Uf_h	9]ba_U``'À\f`]W\`_``c_U`Y
	?Øbgh`Yf'i bX' <ubxk td="" yf_yf<=""></ubxk>
	ghY``Yb']\fY'K Yf_Y'Ui g
H\YUhYfjcfghY``ib[FY[Y`a À»][ˈ]a '5`hYb'FUh\Ui g'
	$H]W_Yhg'jcf'Cfh'Yf\lambda^h]WX$

+"'9]b\Y]a]gW\Y'GcijYb]fg'a]hbUW\ < Ui gY'bY\a Yb

JYfdUggYb'G]Y'b]W\hž'Y]b][Y'\UbX[YZYfh][hY'GcijYb]fg'ni YfkYfVYbžia'7cYgZY`X']b'9f]bbYfib['ni'VY\U`hYb"';ihY 5b`UiZghY``Yb'g]bX.

- ?`Y]bY'@ÀXYb']b'XYf'5`hghUXhž'X]Y'?i bgh\UbXk Yf_'i bX fY[]cbU`Y'GdYn]U`]hÀhYb'j Yf_Ui ZYb"
- $\bullet \hspace{0.1cm} 8\hspace{0.1cm}]Y\hspace{0.1cm} {}^{\text{`}}\hspace{0.1cm} H \hspace{0.1cm} O d\hspace{0.1cm} ZY\hspace{0.1cm} f\hspace{0.1cm} Y\hspace{0.1cm}]^{\text{`}}\hspace{0.1cm}]b\hspace{0.1cm} {}^{\text{`}}\hspace{0.1cm} QY\hspace{0.1cm} \hspace{0.1cm} h\hspace{0.1cm} Y\hspace{0.1cm} Z\hspace{0.1cm} D\hspace{0.1cm} f\hspace{0.1cm} \backslash\hspace{0.1cm} U\hspace{0.1cm} b\hspace{0.1cm} X\hspace{0.1cm} [\hspace{0.1cm} \hspace{0.1cm} Y\hspace{0.1cm} ZY\hspace{0.1cm} f\hspace{0.1cm} h\hspace{0.1cm}] \hspace{0.1cm} I\hspace{0.1cm} h\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} I\hspace{0.1cm} I\hspace{0.1cm} I\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} I\hspace{0.1cm} Y\hspace{0.1cm} I\hspace{0.1cm} I\hspace{0.1c$

 $8] YgY ; Y Y] a h] ddg k YfXYb \to fYb '5 i ZYbh \ U `h'] b '7 c YgZY `X VYfY] W Yfb 'i b X ' \to b Yb ' \ Y `ZYb Z'X] Y 'GhUXh'j cb'] \ fYf' i fgd f Øb [`] W Yb GY] h Y '_Ybb Ybni `Yfb Yb''; Yb] Y \ Yb'G] Y 'X] Y 'fi \] [Y '5 ha cgd \ A fY Z' X Ug ZfY i b X `] W Y A] h Y] b Ub X Yf' i b X 'X] Y 'ZY ggY `b X Y '? i `hi f Z' X] Y '7 c Y g ZY `X 'g c Y] b n] [Ufh] ['a UW h' \ \]$

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