

8 Ug'b À W ghY'Gd]Y`ZYghj Yfn]bg`]W Yf \ib[f][Yf'=bgh]hih]cbYb']gh k U\fgW Y]b`]W '9h\Yf

- :]XY`]hm'8][]hU`'5ggYhg'a OW\hY'gY]bYb']bgh]hi h]cbY``Yb ?i bXYb'V]g'9bXY'&\$&&'X]Y'A O[`]W_Y]h'V]YhYbž'9h\Yf'ni _Ui ZYbž'ni '\UbXY`bž'ni 'j Yf_Ui ZYb'i bX'ni 'j Yfk U\fYb
- 9]b][Y'+bgh]hi h]cbYb'k YfXYb'k U\fgWXY]b`]WX'Ui Z'XUg
 G\Ub[\U]!I d[fUXY'j cb'9h\YfYi a 'k UfhYbž'XUg
 j cfUi gg]WXh`]WX'GhU_]b[!5V\YVi b[Yb'Yfa Ò[`]WXYb'k]fX

8]Y'GhU_]b[!FYbX]hYbž'X]Y'5b`Y[Yf'Yhnh'a]h'9h\Yf'jYfX]YbYb
_ObbYbž'g]bX'`Ui h'6fUbW\YbhY]`bY\a Yfb'VYfY]hž']bgh]hi h]cbY``Yg
?Ud]hU``]a '[fc»Yb'Gh]``Y]bni Vf]b[Yb"'5VYf'FY[i`]Yfi b[g!'ibX
JYfk U\ff]g]_Yb'V`Y]VYb'\c\Y'<ØfXYb"'

9h\YfYia \Uh`\YhnhY`K cW\Y`gY]bYb``Ub['Yfk UfhYhYb`, VYf[Ub[j ca 'DfccZlcZlK cf_'ni a 'DfccZlcZlGhU_Y`YfZc`[fY]W\'Xi fW\[YZØ\fh' i bX`Y]b][Y`\UVYb`[YgU[hž`XUgg`X]Y`: i g]cb`XYb`=bj Ygha Ybh`7UgY j cb`9h\Yf`ZØf`=bgh]hi h]cbYb` j c``ghÀbX]['j YfÀbXYfh "

Ni gÀhn`]WX 'ni f'6YgY]h][i b['U``Yf'V]g'Ui Z'Y]bYb'6fi WX hY]``XYb
9bYf[]Yj YfVfUi WX 'XYf'6`cW_WX U]bYfa Ò[`]WX h'X]Y
Ni gUa a YbZØ\fi b['ni 'Y]bYa 'DfccZlcZlGhU_Y!GmghYa 'Hc_Yb!

♣b\UVYfbž'ni gÀhn`]WXY'Hc_Yb'ni 'j YfX]YbYbž']bXYa 'g]Y'Ub'XYf
6`cW_WX U]b!J U`]X]Yfi b['hY]`bY\a Yb' 'À\b`]WX'ghUV]`Yb
ZYghj Yfn]bg`]WXYb'Fci h]bYbž'X]Y'gY]h``Ub[Ya 'Y]b'A Uf_YbnY]WXYb
g]bXži a '[Y[Yb'X]Y'Jc`Uh]`]hÀh'j cb'5_h]Yb'i bX'Fc\ghcZZYb'ni
X]j Yfq]Z|n]YfYb"'

J]j Y_ 'F Ua Ub < YUX'c Z'Dfcc Zlc ZlGhU_Y'VY]'XYf'8][]hU`'5ggYh
:]bUbWY!D`UhhZcfa '6]hCcXUž'gU[hYž'XUgg'JU`]XUhcfYb'Y]bY
6`cW_gi Vj Ybh]cb'j cb'Yhk U'('i ž'HfUbgU_h]cbg[YVØ\fYb'j cb
XYfnY]h'Yhk U''%z) i 'i bX'Y]bYb'a Ul]a U`'Yl hfU\]YfVUfYb'K Yfh
fA 9J Ł'nk]gWXYb'\$z&'i 'i bX'\$z) i 'j YfX]YbYb'_ObbYb' 'Ub
U[[fY[]YfhY'GhU_]b[!FYbX]hY'j cb'Yhk U'*'i "

8]Y FYbX]hY]gh'Y]bY XYf'; fi bXgÀi `Yb XYf
hfUX]h]cbY``Yb':]bUbnYb'i bX XYf
?fmdhcZ]bUbn]Yfi b[ž'i bX X]Y '9H<!GhU_]b[!FYbX]hY
k]fX XYb' f]g]_cZfY]Yb'GUhn 'XYg'?fmdhc!

2 _cgmghYa g'XUfghY``Ybž'[YbUi 'k]Y'X]Y'HfYUgi fm!
FYbX]hY XYb' f]g]_cZfY]Yb'N]bg 'ZØf'X]Y'hfUX]h]cbY``Y
:]bUbn]Yfi b['XUfghY``hž' ž'gU[hY'Yf'ni '6`cW_k cf_g"

DfUbUj ??UbUXYžDcfhZc`]ca UbU[Yf:XYf:8][]hU`:5ggYhg:5`d\UGhfUhY[mjcb:JUb9W_žgU[hYž:XUgg:9H<:]a 'JYf[`Y]WX'ni 'UbXYfYb YfhfU[gghUf_Yb'*bghfia YbhYb'k]Y'*bj Ygha Ybh!; fUXY!5b`Y]\Ybž?ca a i bU`Ub`Y]\Yb'i bX'GWXUhnk YWXgY`b'k YhhVYk YfVgZÀ\][YFYbX]hYb'\Uh":8]Y'<Ài Z][_Y]hž'a]h'XYf'5b`Y[Yf'X]YgY'FYbX]hYYfn]Y`YbžgY]`YVYbZU``g'Y]b'D`i gdi b_hž:ZØ[hY'Yf'\]bni "``

 $: \emptyset \setminus fi b[g_f AZhY : XYf'? fmd hc! < YX[YZcbXg!:]fa U'; `cVY'' : 7 Ud]hU`gU[hYb'[Y[Yb\emptysetVYf'6`cW_k cf_gž'g]Y : Yfk UfhYbž'XUgg'X]Y : GhU_]b[!FYbX]hYb'VY] : ghY][YbXYa : J c`i a Yb'Ui Z'ØVYf'* : ghY][Yb__\ObbhYbž'k Ug'ni gAhn`]WXY'J Yfa O[Ybgk YfhY']b'XYf'? YhhY'V]bXYb k ØfXY''$

K Ybb'X]YgY:]bUbn]bgh]hi hY'VY[]bbYbž']b'XYb'FUi a
Y]bni Xf]b[Yb'i bX'X][]hU`Y'JYfa Ò[Ybgk YfhY']b']\fY'6ØW\Yf
Ui Zni bY\a Ybž'k YfXYb'g]Y'g]W\bUhØf`]W\ni 'XYb'ghUV]`ghYbž
[fÒ» hYbž'Ua 'Y]bZUW\ghYb'ni '\UbXY`bXYb'i bX'g]W\YfghYb
JYfa Ò[Ybgk YfhYb'a]h'XYb'\ÒW\ghYb'9fhfÀ[Yb'\]b[Ync[Yb
ZØ\`Yb ž'gU[hY'A Uhh'@Ugcbž'7\]YZ'±bj Ygha Ybh'CZZ]WYf'j cb'; `cVY''
7 Ud]hU`''' 9h\YfYi a 'ØVYfdfØZh'U``X]YgY'? ÀghW\Yb"

8 Y f '8][]hU``5ggYh'5fa 'j cb':]XY`]hm' \(\delta \) Ygha Ybhg'k]```gY]bYb]bgh]hi h]cbY``Yb'5b`Y[Yfb'X]Y'A O[`]W_Y]h'V]YhYb\(\delta \) V]g'9bXY'XYg \(\delta \) Yf'ni '_Ui ZYb\(\delta \) ni '\UbXY`b\(\delta \) ni 'j Yf_Ui ZYb'i bX'ni 'j Yfk U\fYb' 'Y]b'Gd]Y[Y`V]`X'gY]bYf'U_hi Y``Yb'6]hWc]b!DfcXi _hY' \(\delta \) VYgh\(\delta \) h][hY'Y]b'I bhYfbY\a YbggdfYW\Yf"

8]Y'9fnÀ\`i b[Ybž'X]Y'g]W\'Ui g'XYf': i g]cb'Yf[YVYbž'XØfZhYb'XUg; YgUa h]bhYfYggY'j]Y`Yf']bgh]hi h]cbY``Yf'5b`Y[Yf'Ub'XYa JYfa Ò[Ybgk Yfh'Yf\Ò\Ybž']bgVYgcbXYfY'ØVYf'Y]bYb'Ui gfY]W\YbX`Ub[Yb'NY]hfUi a ž'gU[hY'*JW_'BYi fYi hYfž'FYgYUfW\!5bU`mgh'VY]:]XY`]hm'8][]hU``5qqYhq"

K Yf'k]fX'ni Yfgh'UXcdh]YfYb3

8]Y 5Xcdh]cb k]fX k U\fgW\Y]b`]W VY] _fmdhc!bUh]j Yb +bgh]hi h]cbYbž: Ua]`m C ZZ]W g i bX < YX[Y ZcbXg VY[]bbYbž VYj cf g]Y]b +bj Ygha YbhZcbXg! i bX DYbg]cbgZcbXg!DcfhZc`]cg Ui Z[Ybca a Yb k YfXYbž gU[hY F Ua Ub"

?UbUXY'gh]a a hY'ni ž'XUgg': Ua]`m'C ZZ]WYg'i bX'VYgh]a a hY < YX[YZcbXg'Ua '6Yg]hn'j cb'9h\Yf']bhYfYgg]Yfh'gY]b'_ÒbbhYbž'i bX ghY``hY'ZYghž'XUgg'GhUUhgZcbXg'i bX'Gh]Zhi b[Yb'YVYbZU``g'bUW\9b[U[Ya Ybhg'gi W\Yb'_ÒbbhYb"'

8]Y': Ø\fi b[g_fàZhY'j cb'; `cVY'' '7Ud]hU``gU[hYbž'XUgg']\f': cbXg VYUVg]W\h][hž']a a Yf'Yhk Ug'9h\Yf'ni 'VYg]hnYb"

K]f'[``Ui VYbž'XUgg'X]Y'9fghUbk YbXYf'bUhØf`]W\'F]g]_chfÀ[Yf'gY]bk YfXYbž'X]Y'bUW\'? Ud]hU`nik UW\\g'gi W\Ybž'ibX'X]Y'FYbX]hYbk YfXYb'Y]b'6cbig'gY]bž'ia'Y]bYb'HY]`'XYg'F]g]_cgUigni[`Y]W\Ybž'gU[hY'@Ugcb"'8Uni'[Y\OfYb'GhUUhgZcbXgžDYbg]cbgd`ÀbY'ibX': Ua]`m'CZZ]WYg"

5bXYfY ± gh]hi h]cbYbž'k]Y 'ni a '6Y]gd]Y` 'dUgg]j Y JYfa Ò[Ybgj Yfk U`hYfž'\UVYb'k U\fgW\Y]b`]W\ h'XUg'f]W\h][Y A UbXUhž'i a '?fmdhc!9b[U[Ya Ybh'ni '\UVYbž'gU[hYb'Y]b][Y"

$< \emptyset f X Y b ' V Y V Y b$

8 UgʻG\Ub[\U]!I d[fUXYʻj cbʻ9h\YfYi a žʻXUgʻj cfUi gg]W\h`]W\ʻ]bʻXYbbÀW\ghYbʻgYW\gʻV]gʻ%&ʻA cbUhYbʻXi fW\[YZØ\fh`k]fXžʻk ØfXYʻ`Ui hXYf`K YVg]hYʻj cbʻ9h\YfYi a ʻGhU_]b[!5V\YVi b[YbʻYfa Ò[`]W\Yb''

8 UgʻGhU_]b[ʻj cbʻ9H<ʻ]a ʻhfUX]h]cbY``YbʻG]bbYʻgYhnhʻg]YʻX]YgYa F]g]_cʻUi gž'XUʻk]fʻXYbʻNY]hdi b_hʻXYgʻG\Ub[\U]!I d[fUXYgʻb]VXh _YbbYb žʻgU[hY'?UbUXY"

K Ybb'g]Y'Ua '9H<!GhU_]b['hY]`bY\a Ybž'k YfXYb'g]Y
k U\fgW\Y]b`]W\'X]Y'`]ei]XYb'GhU_]b[!8Yf]j UhY
Yf_i bXYbž'X]Y']\bYb'Y]bY'9H<!FYbX]hY'Vf]b[Yb'i bX
[`Y]W\nY]h]['X]Y'@]ei]X]hÀh'Yf\U`hYb ž'gU[hY'Yf"</pre>

 $8] Y `fY[i `Uhcf] g W Y Y U bg] W Y f Y] h `] b b Y f V U `V `X Y g `? f m d h c ! G Y [a Y b h g] g h `] a `; f c * Y b `i b X `; U b n Y b `Y] b `k Y] h Y f Y f `: U_hc f ž `X Y b `= b g h] h i h] c b Y b] b `6 Y h f U W h `n] Y \ Y b ž `g U [h Y b `5 b U `mg h Y b " `$

8 UgʻK Y]» Yʻ< Ui gʻj YfÒZZYbh`]WX hYʻgY]bYʻYfghYʻ I a ZUggYbXYf FU\a Yb '_cbnYbhf]Yfhʻg]WXʻUi ZʻX]Yʻj YfUbhk cfhi b[gj c``Y 9bhk]W_`i b[ˈX][]hU`Yfʻ5ggYhg"ʻ9]b][Yʻ6fUbWXYbhY]`bY\a Yf _f]h]g]YfhYbʻXUgʻ: fUa Yk cf_ʻi bXʻgU[hYbʻ6`cW_k cf_gžʻXUggʻYgʻUb 8 YhU]`gʻZY\`Yʻi bXʻg]WX'ni ʻghUf_ʻUi ZʻX]YʻFY[i`]Yfi b[ʻXi fWX 8 i fWX qYhni b[ʻqhØhnhY"

6Yf]WXhYžX]Y'j cb'XYf'6]XYb!5Xa]b]ghfUh]cb'[YgUa a Y`h'k i fXYbž Yfa i h][Yb'X]Y'G97'i bX'X]Y'7ca a cX]hm': i hi fYg'HfUX]b[7ca a]gg]cb'fl7: H7½' U[[fYgg]j '9fa]hh`i b[Yb'i bX 8 i fWXgYhni b[ga U»bU\a Yb'[Y[Yb'fYWXhgk]Xf][Y'DfU_h]_Yb']a CVk c\``Y]b']a 'j Yf[Ub[YbYb'A cbUh'j cf[Y`Y[hYf'; YgYhnYbhk i fZ j cfgW\`À[hž'6]hWc]b'i bX'9h\Yf'U`g'K UfYb'i bhYf'XYf'7: H7'ni fY[i `]YfYbž'gU[hY'XYf'G97!J cfg]hnYbXY'; Ufm'; Ybg`Yfž'XUgg'X]Y a Y]ghYb'?fmdhcUb`U[Yb' `UV[YgY\Yb'j cb'6]hWc]bž'X]Y'Yf'U`g K UfYb'VYhfUW\hYh' 'K YfhdUd]YfY'g]bX"

 $= gh'GhU_]b[!FYbX]hY'Y]bY'G]WXYfYY]h3 'FUa Ub'gU[hY'' K Ybb''Už YfZcfXYfh'XUg'Y]bY'UbXYfY'; fi ddY'j cb'=bj YghcfYb''$

8]Y'AU_fcia[YVib['k]fX'YVYbZU``g'Y]bY'Fc``Y'gd]Y`Ybž'ZØ[hY'XYf6]hCcXU!AUbU[Yf'\]bni"'8]Y'IG!BchYbVUb_'\Uh'Ua'A]hhkcWXnia'Xf]hhYb'AU`']b':c`[Y'X]Y'@Y]hn]bgYb'ia'+)'6Ug]gdib_hYUb[Y\cVYbžia'X]Y'\DZ'Uh]cb'Y]bniXÀaaYb"

A UWUi `Um`DYhYfgcb`hfi ['ni f`6Yf]WX hYfghUhhi b['VY]"

п • п

 $8 \ Y \ f' \ 6 \ Y \ f' \ b[fm' + bgh]hi \ h]cbg' \ B \ Y \ h' \ D`Um' + g' @] \ Y`m' \ 9 \ h' \ Y \ f' \]gh' \ Y]b \ V' \ Z]b \ Ub \ n] \ Y``Y' \ 6 \ Y \ f \ Uhi \ b["$

8 Y hU]`g

6 Y gi W Y b 'G] Y 'i b g 'U i Z '_fmd hc!b Y k g "Uh