

8]Y`NU\``XYf`cZZYbYb`<UZhVYZY\`Y`]b`6UXYb!K ØfhhYa VYf[\Uh`g]WX`gY]h`&\$&%`ZUgh`j YfXcddY`h"`5_hi Y``Y`9bhk]W_`i b[YbibX`<]bhYf[fØbXY"

 $8]Y ?? f] a]b U `ghUh]gh]_ ...]b `6 U X Y b ! K ØfhhY a V Y f[`c ZZY b V Ufh Y]b Y b g] [b] Z]_ U b hY b `5 b gh] Y [`X Y f ' < U ZhV Y Z Y \ `Y ž `X Y f `g] W `j cb `& $& W V] g `ni a %" `$ `] `& $& ` Z U gh j Y f X c d d Y `h ` U h" `8] Y g Y f 5 b gh] Y [`k] f Zh : f U [Y b `ni f G] W Y f \ Y]h `i b X `ni f : i b _h] c b g k Y] g Y `X Y g `$ gh] ng mghY a g `U i Z' 5 _h i Y ``Y `GhUh]gh]_ Y b `n Y] [Y b ž `X U g g `] b g [Y g U a h `&) "' , , ' < U ZhV Y Z Y \ `Y] a `d c `] n Y] `] W Y b `$ Z c f a Uh] c b g g mghY a `j c f `] Y [Y b " `Ni a `J Y f [`Y] W \ ... $a `$J \ f `& $& W `[U V `Y g ``Y X] [`] W `%' ") (& `U i g g h Y \ Y b X Y ` < U ZhV Y Z Y \ `Y " 9] b `g c `W `X f U a Uh] g W Y f `5 b g h] Y [`ZØ \ f h `X U ni ž `X U g g `j] Y `Y `6 Ø f [Y f Ø V Y f `X] Y ` <] b h Y f [f Ø b X Y `i b X `X] Y `6 Y X Y i hi b [`X] Y g Y f `N U \ `Y b b U W X X Y b _ Y b "$

8 Ugʻ@UbXYg_f]a]bU`Ua hʻfl@? 5Ł`\UhʻX]YgY`NU\`Ybʻj YfÒZZYbh`]W\hž XcW\Y]bYʻGdfYW\Yf]bʻVYhcbhžʻXUggʻXYfʻ5bgh]Y[ʻb]W\h nk Ub[g`Ài Z][ʻY]bYʻNi bU\a YʻXYfʻ?f]a]bU`]hÀhʻVYXYi hYh"ʻ9gʻgY] k]W\h][ʻni 'Yf_YbbYbžʻXUggʻ<UZhVYZY\`YʻhÀ[`]W\ʻj c``ghfYW_h k YfXYb"'BUW\ʻXYfʻ: YghbU\a YʻY]bYfʻ[Ygi W\hYbʻDYfgcbʻk YfXYʻXYfʻ: U\bXi b[gUi ZhfU[ʻgcZcfhʻUi gʻXYa 'GmghYa '[Y`ÒgW\h"·8]Ygʻ_ÒbbhYYf_`ÀfYbž'k Ufi a 'X]Y`NU\`YbʻgcʻghUf_ʻgW\k Ub_Ybʻi bX'b]W\h'U`g

<]b hY f[fØb X Y 'X Y f' < UZhV Y ZY \ `Y

 $: \grave{A}``Yb`` \&Y`h`Yg`g]W\&`ia `DYfgcbYbž`[Y[Yb`X]Y`_cb_fYhY JYfXUW\&hga ca YbhY`jcf`]Y[Yb"`6Y]`XYb`jYfV`Y]VYbXYb`&&"(-% < UZhVYZY\`Yb`ghY\h`X]Y`Jc``ghfYW_ib[`Y]bYf`VYfY]hg`jYf\Åb[hYbGhfUZY`]a `JcfXYf[fibX"'<]Yf`k]fX`XYih`]W&ž`XUgg`X]Y`< UZhVYZY\`Yb]W&h`]gc`]Yfh`VYhfUW&hYh`kYfXYb`_ObbYbž`gcbXYfb`j]Y`aY\f`Y]bHY]``Y]bYg`[fO`>YfYb`fYW&h`]W&Yb`DfcnYggYg`g]bX"$

9]b k Y]hYfYf]bhYfYggUbhYf5gdY_h]ghžXUgg'<UZhVYZY\`YghYhg XUbb]a 'GmghYa 'Ui ZhUi W\Ybžk Ybb'X]Y'YbhgdfYW\YbXYb'8Y`]_hY]b '6UXYb!K ØfhhYa VYf['VYUfVY]hYh'k YfXYb"'8Ug'nY][hžXUgg'b]W\h U``Y'cZZYbYb'<UZhVYZY\`Y'i ba]hhY`VUf'a]h``Ui ZYbXYb'9fa]hh`i b[Yb j YfVi bXYb'g]bX"'J]Y`a Y\f'_Ubb'Yg'g]W\'i a 'U`hY': À``Y'\UbXY`bž X]Y'`\Ab[YfZf]gh]['VYghY\Yb'V`Y]VYbž'V]g'g]Y'Ybhk YXYf'j c``ghfYW_h cXYf'UbXYfk Y]h]['Yf`YX][h'k YfXYb"

K UgʻVYXYi hYhʻXUgʻZØf`X]Y; YgY``gWX UZh3

8]Y`XfUgh]gWXY`Ni bU\a Y`XYf`<UZhVYZY\`Y`]gh`b]WXh`bi f`Y]bY
ghUh]gh]gWXY`; fÒ»Y/g]Y`gd]Y[Y`h'Ui WX`DfcnYggY`]bbYf\U`V`XYg

i gh]ngmghYa g`k]XYf"`9g``Y[h`bU\Yž`XUgg`Y]bY`J]Y`nU\``j cb

DYfgcbYb`]b`XYf; YgY``gWXUZh`U`g`hUhj YfXÀWXh][`YfUWXhYh`k]fX`cXYf

VYfY]hg`ghfUZZÀ``][`[Yk cfXYb`g]bX": Øf`X]Y`6Øf[Yf`ghY``h`g]WX`X]Y
: fU[Y`bUWX`XYf`G]WXYf\Y]h`]b`]\fYa `5``hU["`G]Y`a ÒWXhYb`k]ggYbž

k]Y`j]Y`Y`DYfgcbYb`a Ò[`]WXYfkY]gY`]b`XYf`BÀ\Y`g]bXž`X]Y`Ui Z

Y]bYb`<UZhVYZY\``k UfhYb"

8]Y'FYU_h]cbYb'Ui Z'X]Y'j YfÒZZYbh']W\hYb'NU\`Yb'g]bX'[Ya]gW\h''
9]b][Y'6Øf[Yf'Ya dZ]bXYb'I bVY\U[Ybž'k À\fYbX'UbXYfY'[`Ui VYbž
XUgg'X]Y'\$\rightarrow\$ gh]n'i bX'Dc`]nY]'[i h']b'XYf'@U[Y'g]bXž'X]Y'G]hi Uh]cb'ni
a UbU[Yb"'9g']gh'Y]bY'_ca d`YIY'@U[Yž'X]Y'j]Y`Y': UW\hhYb
VY]b\U`hYhž'k]Y'ni a '6Y]gd]Y`'XUg'J YfhfUi Yb']b'X]Y'ghUUh`]W\Yb
\Dgh]hi h]cbYb'i bX'XYfYb': À\][_Y]hž'J YfVfYW\YbgdfAj Ybh]cb'ni
[Yk À\f`Y]ghYb"

 $GWX`]Y*`]WX`]gh`ni `VYXYb_Ybž`XUgg`NU\`Yb`U``Y]b`b]WXh`X]Y`[UbnY; YgWX]WXhY`YfnÀ\`Yb"`9g`]gh`YfZcfXYf`]WXž`X]Y`<]bhYf[fØbXY`i bXX]Y`8 mbUa]_`ni `j YfghY\Ybž`X]Y`ni `gc`WXYb`GhUh]gh]_Yb`ZØ\fYb"`8 Ug @? 5`a U\bh`XYg\U`Vž`X]Y`G]hi Uh]cb`X]ZZYfYbn]Yfh`ni `VYhfUWXhYb"$

9]b 6`]W_ Ui Z'X]Y Dc`]nY]UfVY]h

 $8]Y `Dc`]nY] UfVY]h'k]fX `Xi fWX `X]YgY `9bhk]W_`i b[Yb `Ui Z'X]Y `DfcVY [YghY``h'' 8]Y `8 Ui Yf'j cb' < UZhVYZY\`Yb `i bX `XYfYb `J c``ghfYW_i b[g]bX `k]WX h][Y :: U_hcfYb ž'X]Y `]b `XYf `ghfUhY[]gWX Yb `D`Ubi b[`i bX 8 i fWX ZØ\ fi b['j cb `Dc`]nY]Y]bgÀhnYb `VYfØW_g]WX h][h'k YfXYb a ØggYb'' 8]Y `5 i Z_`Àfi b[`i bX `X]Y `6Y\UbX`i b['j cb HUhj YfXÀWX h][Yb `g]bX `nYbhfU`Y `5 i Z[UVYb `XYf'Dc`]nY]ž'X]Y `Xi fWX ghY][YbXY`NU\`Yb']a a Yf`\YfUi gZcfXYfbXYf'k YfXYb''$

Ni gUa a YbZUggYbX``Àggh`g]W\`gU[Ybž'XUgg`XYf`5bgh]Y[`XYf < UZhVYZY\`Y`]b`6UXYb!K ØfhhYa VYf[`b]W\hibi f`Y]bY`ghUh]gh]gW\Y JYfÀbXYfi b[`XUfghY``hž'gcbXYfb`Ui W\`: fU[Yb`ni f?f]a]bU`]hÀhgVY_Àa dZi b[`i bX`ni f`G]W\Yf\Y]h`]b`XYf`; YgY``gW\UZh Ui Zk]fZh"`K]Y`X]Y`Dc`]nY]`Ui Z'X]YgY`< YfUi gZcfXYfi b[Yb`fYU[]Yfhž k]fX`YbhgW\Y]XYbX`gY]b`ZØf`XUg`JYfghÀbXb]g`XYf`?f]a]bU`]hÀh`]b XYf`FY[]cb`i bX`XUg`JYfhfUi Yb`XYf`6Øf[Yf`]b`X]Y G]W\Yf\Y]hg_fÀZhY"

8 Yf '5 bgh]Y['XYf' < UZhVYZY\ `Y']b '6 UXYb!K ØfhhYa VYf['k]fZh: fU[Yb ni f'?f]a]bU`]hÀhgYbhk]W_`i b['i bX'ni f'9ZZ]n]Ybn XYf' i gh]n 'Ui Z' K À\fYbX'X]Y'NU\ `Yb 'U`Ufa]YfYbX'YfgWXY]bYbž']gh'Yg'k]WXh][ž'X]Y ni [fi bXY'`]Y[YbXYb': U_hcfYb'ni 'j YfghY\Ybž'X]Y'ni 'X]YgYa 5 bgh]Y['VY][YhfU[Yb '\UVYb'_ObbhYb"'9]b'a O[`]WXYf'9]bZi ggZU_hcf_ObbhY'X]Y'Yf\O\hY'Dc`]nY]dfÀgYbn'i bX'X]Y'j YfghÀf_hYb 6Ya Ø\i b[Yb'ni f'J YfVfYWXYbgVY_Àa dZ b['gY]bž']bgVYgcbXYfY']b VYgh]a a hYb'_f]a]bY``Yb'6YfY]WXYb'k]Y'8 fc[Yb\UbXY``cXYf; Yk U`h_f]a]bU`]hÀh"'Ni XYa '_ObbhY'XUg'6Yk i gghgY]b']b'XYf 6Yj O`_Yfi b['ZØf'X]Y'A Y`Xi b['j cb'J YfVfYWXYb'[Ygh]Y[Yb'gY]bž k Ug'ni 'Y]bYf'Yf\O\hYb'5bnU\``Ub'9fa]hhi b[Yb'ZØ\fhY''

GhUh]gh]gWXY 9bhk]W_ i b[Yb i bX HfYbXg

9]b 6`]W_ Ui Z'X]Y 8 UhYb XYg @ 5 []Vh 5 i ZgW `i gg ØVYf X]Y

 $gdYn]Z]gWXYb`8Y`]_hYž'X]Y`nif`5igghY``ib[`jcb`<UZhYYZY\`YbZØ\fYb"`=a`\lambda\\f`&\$&&`VY]gd]Y`gkY]gY`VYhfi[`X]Y`NU\``XYf JYf\UZhib[Yb`UiZ[fibX'jcb`8fc[YbXY`]_hYb`]b`6UXYb! KØfhhYaVYf[`ØVYf')"\$\$\ž'kUg`Y]bYb`5bgh]Y[`jcb`YhkU'%)`i`]a JYf[`Y]WX`ni`&\$\&%`XUfghY``h"`8]Yg`XYihYh`UiZ`Y]bY`jYfghAf_hYGWXkYfdib_hqYhnib[`XYf`Dc`]nY]`]b`X]YqYa`6YfY]WX`\]b"$

Ni gÀhn`]W\`\UVYb`I a ZfU[Yb`ni f`G]W\Yf\Y]hgk U\fbY\a i b[`]b`XYf 6Yj Ò`_Yfi b[`[YnY][hžXUgg`Y]b`XYi h`]W\Yf`5bgh]Y[`XYf`Gcf[Yb \emptyset VYf`?f]a]bU`]hÀh`ZYghni ghY``Yb`]gh"`9]bY`I a ZfU[Y`XYg`GK F`Ui g XYa `\J\f`&\\$&\Yf[UV\ZXUgg`*)`i `XYf`6YZfU[hYb`Ub[UVYb\Z\g]]W\`]b]\fYa `K c\bi a ZY`X`k Yb][Yf`g]W\Yf`ni `Z\Ø\`Yb`U`g`]b`XYb j Yf[Ub[YbYb`\J\fYb"`8]YgY`K U\fbY\a i b[`_\ObbhY`X]Y`FYU_h]cb Ui Z'X]Y`Yf\O\hYb`<U\Zh\YZY\`Y`VYY]bZi ggYb`i bX`ni `k Y]hYfYb DfchYghYb`cXYf`: cfXYfi b[Yb`bUW\`fY\Zcfa]YfhYb G]W\Yf\Y]hgdc`]h]_Yb`\Z\fYb"

Ni gUa a Yb\Ab[Ya]hXYf xi gh]nfYZcfa

DUfU``Y``ni `XYb`ghY][YbXYb`NU\`Yb`XYf`< UZhVYZY\`Y`k YfXYb`]b
6UXYb!K ØfhhYa VYf[``Ui ZYbX`8]g_i gg]cbYb`ØVYf`bchk YbX][Y

i gh]nfYZcfa Yb``Ui h"`9I dYfhYb`k Y]gYb`XUfUi Z`\]bž`XUgg`X]Y`i gh]n
ØVYf`UghYh`]gh'i bX`X]Y`5bnU\``XYf`UV[YgW\`cggYb`JYfZU\fYb`dfc

i bX`Y]bY`FYZcfa k ØfXY`Y]bY`YZZ]n]YbhYfY: U``VYUfVY]hi b[
i bX`Y]bY`VYggYfY`FYggci fWYbbi hni b['j YfgdfYW\Yb"`N]Y``Y]bYf
gc`W\Yb`FYZcfa k ÀfY`Ygž'b]W\h'bi f`X]Y`FYU_h]cbgZÀ\][_Y]h`XYf

i gh]n`ni 'j YfVYggYfbž'gcbXYfb`Ui W\Y]bY`dfÀj Ybh]j Y

?f]a]bU`]hÀhgVY_Àa dZ b['ni 'ZÒfXYfb"

8]YgY'8mbUa]_'nk]gW\Yb'ghY][YbXYb'<UZhVYZY\`Yb'i bX'XYf
8]g_i gg]cb'ØVYf'FYZcfa a U»bU\a Yb'_ObbhY'`Ub[Zf]gh][Y
5i gk]f_i b[Yb'Ui Z'X]Y'; YgY``gW\UZh']b'6UXYb!K ØfhhYa VYf['i bX
X]Y'[YgUa hY'JYfVfYW\Ybgk U\fbY\a i b['\UVYb"'9g'V`Y]Vh
UVni k UfhYbž'k]Y'g]W\'X]YgY'G]hi Uh]cb'Ybhk]W_Y`b'k]fX'i bX'k Y`W\Y
A U»bU\a Yb'Yf[f]ZZYb'k YfXYbž'i a 'gck c\``X]Y'G]W\Yf\Y]h'U`g'Ui W\
XUg'JYfhfUi Yb']b'X]Y'\$\rightarrow\$gh]n'ni 'ZOfXYfb"

±g[YgUa h'Yfk Y]gh'g]W\ 'XYf'5bgh]Y['XYf'<UZhVYZY\ `Y'U`g
_ca d`Yl Yg'D\Abca Ybž'XUg']b'Y]bYb'VfY]hYfYb'[YgY``gW\UZh`]W\Yb
i bX'dc`]h]gW\Yb'?cbhYl h'Y]b[YVYhhYh']gh"'8]Y'ni [fi bXY'`]Y[YbXYb
l fgUW\Yb'i bX'X]Y'_c``Y_h]j Y'K U\fbY\a i b['XYf'6Yj Ò`_Yfi b[
a ØggYb']b'XYf'8YVUhhY'VYfØW_g]W\h][h'k YfXYbž'i a 'bUW\\U`h][Y
@Ògi b[Yb'ni 'Z]bXYb"</pre>

8 YhU]`g

6Ygi WXYb G]Y i bg Ui Z b!U["XY