

9]bVfi W\`]b`9ggYb.`5[[fYgg]j Y @UXYbX]YV]b`gi W\h`Dc`]nY]`a]h': chcg

8]Y 'Dc`]nY] '9ggYb 'gi WX h'bUWX 'Y]bYf '@UXYbX]YV]bž'X]Y 'Y]bY A]hUfVY]hYf]b ']b 'Y]bYf '8 fc [Yf]Y 'Ub[Y[f]ZZYb '\ Uh" '<]bk Y]gY YfVYhYb °

9ggYb fthgŁ

±b 'Y]bYf'gWXY]bVUf'[Yk Ò\b`]WXYb '9]b_Ui Zg]hi Uh]cb ']b '9ggYb '\Uh g]WX 'Ua '("'⅓ b]'X]YgYg '⅓U\fYg'Y]b 'J cfZU``'YfY][bYhž'XYf'X]Y
5i Za Yf_gUa _Y]h'XYf'Dc`]nY]'Ui Z'g]WX 'n]Y\h"; Y[Yb'%, .'\$'I\f
VYhfUh'Y]bY'i bVY_UbbhY': fUi 'a]h'Y]bYa '?]bXYfk U[Yb'Y]bY
8fc[Yf]Y']b 'XYf'?i d ZYfXfY\Yf'GhfU» Y"'Ni bÀWXgh'hÀh][hY'g]Y'Xcfh
]\fYb'9]b_Ui Z'i bX'VYnU\`hY'X]Y'K UfY'Ub'XYf'?UggY"

BUWW XYa '6YnU\ `Yb `` ÒghY 'YXcW 'XYf'5` Ufa 'Ua '5i g[Ub['Ui g" 8]Yg'ZØ\ fhY 'ni 'Y]bYf'j cf'k Yb][Yb 'HU[Yb 'j YfÒZZYbh`]WW hYb : U\ bXi b['XYf'Dc`]nY]" 8Yf'5` Ufa 'gWW]Yb 'i bYf_`Af`]WW ž'i bX'Y]bY A]hUfVY]hYf]b 'XYf'8fc[Yf]Y 'gdfUWW 'X]Y 'J YfXÀWW h][Y 'Ubž'i a 'bUWW XYf'I fgUWW Y 'ni 'ZfU[Yb" 8]Y 'Zc`[YbXY'5i gY]bUbXYfgYhni b[Ybhk]W_Y`hY'g]WW bY``ni 'Y]bYf'U[[fYgg]j Yb'G]hi Uh]cb"'GhUhh _ccdYfUh]j 'ni 'gY]bž'k i fXY'X]Y': fUi 'ni bY\a YbX'Ui ZVfUi gYbX'i bX gWW 'i ['i a 'g]WW ž'k À\fYbX'g]Y'j Yfgi WW hYž'ni 'Z]Y\Yb"

VYf[f]ZZUiZX]YA]hUfVY]hYf]b

 $8]Y \cdot 5b [YghY ``hY \cdot XYf \cdot 8 fc [Yf]Y \cdot j Yfgi W.hY \check{z} X]Y :: fUi \cdot `Ui Zni \setminus U`hY b\check{z} Xc W. `X]YgY \cdot k Uf \cdot VYfY]hg \cdot Ui Z \cdot XYa \cdot Gdfi b ["'@Yhnh`]W. `Ybh_Ua \cdot X]Y HUhj YfXÀW.h][Y \cdot ni :: i » ']b \cdot F]W.hi b ['<]bgVYW_Yf '@Ò\ "'8]Y U[[fYgg]j Y \cdot FYU_h]cb \cdot XYf :: fUi 'i bhYfghfY]W.h \cdot X]Y \cdot dchYbn]Y ``Yb F]g]_Yb \check{z} XYb Yb \cdot 5b [YghY ``hY \cdot]a \cdot 9]b nY`\ Ub XY ``Ui g[YgYhnh \cdot g]b Xž$

VYgcbXYfg'k Ybb'Yg'i a '8]YVghÀ\`Y'cXYf'j YfXÀW\h][Y'5_h]j]hÀhYb [Y\h"

 $8]Y `Dc`]nY] "j cb` 9ggYb` Yfa]hhY`h'bi b`]b`X]YgYa ": U```i bX`\Uh , VYfk UWXi b[gV]`XYf'j YfÒZZYbh`]WX hži a '<]bk Y]gY`ni f`<math>\Rightarrow$ XYbh]hÀh XYf`HÀhYf]b`ni 'Yf\U`hYb"'5i Z'XYa ": U\bXi b[gdcfhU``XYf`Dc`]nY] _ObbYb`]bhYfYgg]YfhY`6 \emptyset f[Yf`X]Y`6]`XYf`Y]bgY\Yb`i bX a O[`]WXYfk Y]gY`k Yfhj c``Y' \Rightarrow Zcfa Uh]cbYb`ni f`5i Z_`Àfi b['XYg J cfZU``g`VY]hfU[Yb"'8 Ug`: U\bXi b[gdcfhU``]gh'i bhYf`Zc`[YbXYa @]b_'ni [Àb[`]WX.`\hhd g. #d c`]nY]"bfk #ZU\bXi b[#%(() %-"

Dc`]nY]`]W\Y'9fa]hh`i b[Yb'i bX'5i Zfi Z'ni f A]h\]`ZY

8]Y 'Dc`]nY]'V]hhYhii a 'A]h\]`ZY 'XYf'6Yj Ò`_Yfi b["'¾XYfž'XYf <]bk Y]gY [YVYb'_Ubbž'k]fX'Ui Z[YZcfXYfhž'g]W\'i bhYf'XYf HY`YZcbbi a a Yf'\$&\$\#, &-!\$'cXYf'dYf'9!AU]`'Ub\]bk Y]gY"YggYb4 dc`]nY]"bfk "XY'ni 'a Y`XYb"'A]h'[Yn]Y`hYb \Dc`]nY]'bfk "XY'ni 'a O[`]W\Yfk Y]gY'X]Y'J YfXÀW\h][Y]XYbh]Z]n]YfYb'i bX'ni f'FYW\YbgW\UZh'n]Y\Yb"

8]Y'K]W\h][_Y]h'gc`W\Yf': U\bXi b[Yb'i bX'X]Y'gW\bY``Y'FYU_h]cb XYf'Dc`]nY]']b'gc`W\Yb'G]hi Uh]cbYb'g]bX'YbhgW\Y]XYbX"'9g'nY][h g]W\ž'XUgg'gY`Vgh'U``h\A[`]W\Y'9]b_\Ai ZY']b'XYb'9]bnY`\UbXY``ni [YZ\A\f`]W\Yb'G]hi Uh]cbYb'Z\GfX]Y'A]hUfVY]hYf'Z\O\fYb'_\ObbYb"'8]Y Dc`]nY]'Yfa i h][h'X]Y'; YgY``gW\UZh\Z'k UW\gUa 'ni 'gY]b'i bX j YfX\AW\h][Yg'JYf\U`hYb'ni 'a Y`XYb\Z'i a 'X]Y'G]W\Yf\Y]h']b'XYb; YgW\\AZhYb'ni 'j YfVYggYfb'i bX'\A\b`]W\Y'JcfZ\A``Y']b'XYf'Ni _i bZh ni 'j Yf\]bXYfb"

CVk c\`XYf'JcfZU``; YgW\]W\hYb'ØVYf'X]Y'< YfUi gZcfXYfi b[Yb']a
9]bnY`\UbXY``i bX'XUg'G]W\Yf\Y]hgf]g]_c'ZØf'5b[YghY``hY
h\Ya Uh]g]Yfhž']gh'X]Y'ghfUZfYW\h`]W\Y'JYfUbhk cfhi b['XYf
JYfXÀW\h][Yb'Y]b'nYbhfU`Yf'Di b_h'''Jcf'U``Ya ž'k Ybb'Yg'ni
d\mg]gW\Yb', VYf[f]ZZYb'_ca a hž'a ØggYb'HÀhYf'ni f'FYW\YbgW\UZh
[Ync[Yb'k YfXYbž'i a 'Y]bY'g]W\YfY'I a [YVi b['ZØf'U``Y'ni
[Yk À\f`Y]ghYb"

?cbhYlh'XYf'@UXYbX]YVghÀ\`Y']b 8YihgWX`UbX

9]b 'VYXYi hYbXYf'HY] 'X]YgYf'8 Y`]_hY']gh'ghfUhY[]gW\`cf[Ub]g]Yfhž cZh'a]h'XYa 'N]Y`ž'5fh]_Y``a]h'\c\Ya 'K Yfh'cXYf'\c\Yf'BUW\ZfU[Y ni 'ghY\`Yb"'8]Y'Ni bU\a Y'XYf'?f]a]bU`]hÀh']a '9]bnY`\UbXY``gcf[h ni XYa 'ZØf'Y]bYb'5bgh]Y['XYf'dgmW\]gW\Yb'6Y`Ughi b[Yb'VY]'XYb A]hUfVY]hYbXYbž'X]Y'g]W\']b'Y]bYa 'ghÀbX][Yb'GdUbbi b[gZY`X nk]gW\Yb'?i bXYbgYfj]WY'i bX'G]W\Yf\Y]hgØVYfk UW\i b['VYk Y[Yb a ØggYb"

$GhUh]gh]gWXY'9bhk]W_ib['jcb@UXYbX]YVghU\`$

8]Y FYU`]hÀh`XYg`@UXYbX]YVghU\`g`nY][h`g]W\`b]W\h`bi f`]b`XYb`cVYb
[YbUbbhYb`Z]bUbn]Y``Yb`JYf`i ghYb"'9]bY`I a ZfU[Y`XYg`8Yi hgW\Yb
<UbXY`g]bgh]hi hg`Yf[UVž`XUgg`a Y\f`U`g`+\$i `XYf`9]bnY`\ÀbX`Yf`]a

*J\f`&\$&' `j cb`Y]bYa `5bgh]Y[`XYg`@UXYbX]YVghU\`g`VYf]W\hYhYb"

9]b`k Y]hYfYf`5gdY_hž`XYf`a Y\f`6YUW\hi b[`Z]bXYb`gc``hYž`]gh`X]Y

XYa c[fUZ]gW\Y`9bhk]\W_`i b[`XYf`HÀhYf"'8]Y`NU\`Yb`nY][Ybž`XUgg

b]W\h`bi f`DYfgcbYb`a]h`Y]bYa `b]YXf][YfYb`gcn]cO_cbca]gW\Yb

GhUhi g`VYhfcZZYb`g]bXž`gcbXYfb`Ui W\`]a a Yf`a Y\f`A YbgW\Yb`Ui g

j YfgW\]YXYbYb`[YgY``gW\UZh`]W\Yb`GW\]W\hYb`]b`XYb`A]hhY`di b_h

fØW_Yb"

p° 划\f`p°; YgWX ÀhnhY 'GWX ÀXY b 'f][b 'A]``]cbYb '9i fcŁ'p°5bhY]` 'XYf

8]YgY'ghY][YbXYb'NU\`Yb'j YfXYi h`]WXYb'XYb'Ub\U`hYbXYb'6YXUfZ
Ub'YZZY_h]j Yb'DfÀj Ybh]cbgghfUhY[]Ybži a 'X]Y'G]WXYf\Y]h`]b
; YgWXÀZhYb'ni 'Yf\Ò\Yb'i bX'A]hUfVY]hYf'gck]Y'?i bXYb'ni
gWXØhnYb"'8]Y'Dc`]nY]'i bX'9]bnY`\UbXY`gj YfVÀbXY'UfVY]hYb
a]hh`YfkY]`Y'Yb[Yf'ni gUa a Ybži a 'VYggYfY'@Ògi b[Yb'[Y[Yb
X]YgY': cfa 'XYf'?f]a]bU`]hÀh'ni 'Z]bXYbž'k cVY]'X]Y'A cXYfb]g]Yfi b[
j cb', VYfk UWXi b[ghYWXbc`c[]Y'i bX'GWXi `i b[Yb'ZØf'A]hUfVY]hYf
]a ': c_i g'ghY\Yb"

8 Y hU]`g

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