

HfU[ÒX]Y'Ui Z'XYf'∃+\$. BYi j Yf\Y]fUhYhY i bX'A i hhYf'VY]'I bZU``'[YhÒhYh

9]b'Zf]gWX'j Yf\Y]fUhYhYg'DUUf'Ui g'?c`i a V]Yb'i bX'A YI]_c gck]Y'X]Y'A i hhYf'XYf'6fUi h'ghUfVYb'VY]'Y]bYa 'hfU[]gWXYb JYf_Y\fgi bZU``']b'7c`cfUXc"

9]bY'Hfu[ÒX]Y'YfgWXØhhYfhY'7c`cfUXcž'U`g'Y]bY'Zf]gWX'j Yf\Y]fUhYhYDUUf_ca V]bUh]cb'Ui g'?c`i a V]Yb'i bX'A YI]_c']b'Y]bYb'hfu[]gWXYbJYf_Y\fgi bZU``'j Yfk]W_Y`h'k i fXY"'8 Ug'DUUf'VYZUbX'g]WX'Ui Z'XYaK Y['ni 'gY]bYf'<cWXnY]hgfY]gY']b'X]Y'a U'YghÀh]gWXYb'6Yf[Y'XYg6i bXYgghUUhYgž'bUWXXYa 'g]Y'Yfgh'ZØbZ'HU[Y'ni j cfž'Ua '%\$"5i [i ghž'[Y\Y]fUhYh'\UhhYb"'8Yf'I bZU``'YfY][bYhY'g]WX'Ua8cbbYfghU[ž'XYa '%) "'5i [i ghž'U`g'XYf'K U[Yb'a]h'XYa '6fUi hdUUfžXYb'9'hYfb'XYf'6fUi h'i bX'XYa 'Y]b'A\f][Yb'Gc\b'i bhYfk Y[g'k Uf"

8]Y'<cffcfgnYbY'YfY][bYhY'g]W\'Ui Z'XYf'\DhYfghUhY'+\\$z'k c'Y]b@Ughk U[Ybz'XYf'[fc»Y'V`Ui Y'?i bghghcZZfc\fY'hfUbgdcfh]YfhYzia_]ddhY"'\D'XYf':c`[Y'Yf[cggYb'g]W\'X]Y')\\$\DZibX'gW\k\YfYbFc\fY'\ØVYf'X]Y':U\fVU\bz'k Ug'ni 'Y]bYa 'a Ugg]j Yb'Ai`h]!:U\fnYi[!7fUg\'Z\f\f\Y''8Yf'5i ZdfU```k Uf'gc'ghUf_z'XUgg'Yfa]bXYghYbg'XfY]'k Y]hYfY':U\fnYi[Y'VYhfUZ"

8 Y hU]`gʻni a 'I b ZU``

8]Y'Dc`]nY]'VYf]W\hYhYž'XUgg'XUg'5i hc'XYf'Zf]gW\'JYf\Y]fUhYhYb'j cb
Y]bYa 'XYf'i a \Yf`]Y[YbXYb'Fc\fYb'[YhfcZZYb'k i fXY"'8]YgY'Fc\fY
k i fXYb'Xi fW\'XUg'I a _]ddYb'XYg'@Ughk U[Ybg'Ui Z'X]Y'GhfU» Y
[YgW\'Yi XYfhž'XUg'XUXi fW\']b'Y]bYa '7\Ucg'YbXYhY"
HfU[]gW\Yfk Y]gY'j Yf`cfYb'XfY]'A YbgW\Yb']\f'@YVYb']b'X]YgYa
I bZU`. 'Fi VÅb'FcXff[i Ynž'' ' '\\J\fY'U`hž'Y]b'?c`i a V]UbYfž'*\`]UbU
D`UhU'A UfhfbYnž'' + '\\J\fY'U`hž'gck]Y']\fY'A i hhYf'@i n'A Y`VU

Ÿ\b`]WXYJcfZÀ``Y`\UVYb']b`XYfJYf[Ub[Yb\Y]h]a a Yf'k]YXYf
: fU[Yb'ni f'G]WXYf\Y]h'Ui Z'XYb'GhfU» Yb'Ui Z[Yk cfZYb"'8]Y
9fa]hh`i b[``Ài Zhž'i a `X]Y'[YbUi Yb'I a ghÀbXY'XYg'I bZU``g
\YfUi gni Z]bXYb'i bX'g]WXYfni ghY``Ybž'XUgg'gc`WXY'HfU[ÒX]Yb']b
Ni _i bZh'j Yfa]YXYb'k YfXYb'_ÒbbYb"

$FYU_h]cbYb'ibX'<]^ZgaU*bU\aYb$

8]Y'5b[Y\Òf][Yb'XYf'j YfghcfVYbYb'Vf]b[Yb'Y]bY'[Yk U`h][Y Gi a a Y'j cb'-) "\$\$\$'8c``Uf'ni gUa a Ybži a 'X]Y'\c\Yb'?cghYb'ni XYW_Ybž'X]Y'Xi fW\'X]Y'HfU[ÒX]Y'YbhghUbXYb'g]bX"'8]Yg'nY][h'XUg Ybcfa Y'5i ga U» ž'XUg'XYf'JYf`i gh'ZØf'X]Y'VYhfcZZYbYb': Ua]`]Yb \Uh"'9]b'gc`W\'d`Òhn`]W\Yg'JYfgW\k]bXYb'\]bhYf`Àggh'Y]bY'Ybcfa Y @W_Y'i bX'gcf[h'ZØf'h]YZY'HfUi f][_Y]h'i bhYf'XYb'JYfk UbXhYb'i bX : fYi bXYb"

8]Y'BUW\f]W\h'jcb'X]YgYa'I b[`\@_'\Uh']b'\XYf'; Ya Y]bg\\\UZh'\Z\@f HfUi Yf'[Ygcf[h'': fYi b\XY'i b\X'6\Y_Ubbh\Y'gUa a Y\b'b]\\\h'bi f Z]bUbn]Y\``\Y'A]hh\Y\`\z'gcb\X\Yfb'gdf\\\X\Yb'Ui \\X'K cfh\Y'\X\Yg'\Hfcgh\Yg'\Z\@f X]Y'<]bh\YfV\`]Y\Yb\Yb'\Ui g'''\Gc\`\\X\Y'\Nk]g\\X\Yb\Z\\``\Y'\gh\Y\``\Yb'\k]f'\U\`\Y'j cf X]Y': fU[Y\z'\k]Y'\ZfU[]\``\X\Ug'\@Y\Y\b'\g\Y]b'_Ubb'i b\X'\k]Y'\k]\\\h]['\Yg']gh\z' i bq\Yf\'\@\Y\Y\b'\ni '\g\\\Ahn\Y\b'' b\X\ni '\g\\\\\\\\h\n\Y\b''

9]b'l bZU```a]h'j Yf\YYfYbXYb': c`[Yb. '\(\pi\)'7c`cfUXc'Yf`YVhYb'Y]bY
Zf]gW\'j Yf\Y]fUhYhY': Ua]`]Y'i bX']\fY'6Y[`Y]hYf'XUg'l bj cfghY``VUfY"
8]YgYf'J cfZU```nY][h'i bgž'XUgg'Yg'X]Y'_`Y]bYb'8]b[Y']a '@YVYb'g]bXž

X]Y 'Yg '`YVYbgk Yfh'a UW\Yb" '8]Y 'HfU[\dot{O} X]Y '\Uh']bYZZUV `Y @Y]XYbgW\UZh 'ZØf 'XUg '@YVYb 'i bX 'X]Y '6YXYi hi b[\dot{I} j cb': Ua]`]Y 'i bX : fYi bXgW\UZh ']bg 'F Ua dYb`]W\h'[\dot{V} f\"

$JYf_Y\fgg]WXYfY]h]bXYbIG5$

8]Y'JYf_Y\fgg]W\Yf\Y]h']b'XYb'JYfY]b][hYb'GhUUhYb']gh'Y]b
VYXYi hYbXYg'H\Ya U'ZØf'X]Y'ÒZZYbh']W\Y'; Ygi bX\Y]h''8]Y'B < HG5
\Uh'i a ZUb[fY]W\Y'A U» bU\a Yb'Yf[f]ZZYbž'i a 'X]Y
: U\fnYi [g]W\Yf\Y]h'ni 'j YfVYggYfb'i bX'X]Y'5bnU\``XYf'I bZÀ``Y'ni
fYXi n]YfYb'''Ni 'XYb'GhfUhY[]Yb'[Y\ÒfYb'X]Y'9]bZØ\fi b[
ghfYb[YfYf'G]W\Yf\Y]hgghUbXUfXg'ZØf': U\fnYi [Yž
5i Z_`Àfi b[g_Ua dU[bYb'ØVYf'g]W\YfYg': U\fYb'i bX'; YgYhnY'ni f
5`_c\c`!'i bX'8fc[Ybj Yfk YbXi b['Ua 'GhYi Yf'''Hfchn'X]YgYf
6Ya Ø\i b[Yb'V'Y]Vh'X]Y'NU\``XYf'JYf_Y\fghchYb'bUW\'k]Y'j cf
U'Ufa]YfYbX'\cW\''8]Y'Gcn]U'dgmW\c`c[]Y'nY][hž'XUgg
a YbgW\`]W\Yg'JYf\U`hYb'Y]byb'YbhgW\Y]XYbXYb'9]bZi gg'Ui Z'X]Y
JYf_Y\fgg]W\Yf\Y]h'\Uhž'Y]bgW\`]Y»`]W\'5gdY_hY'k]Y', VYfa ØXi b[ž
5V'Yb_i b['i bX'5[[fYgg]i]hAh''

Ni gÀhn`]W\`hfY]VYb`hYW\bc`c[]gW\Y`\bcj Uh]cbYb`k]Y Ui hca Uh]gW\Y`BchVfYa ggmghYa Y`i bX`: U\fUgg]ghYbn!GmghYa Y`XYb?Ua dZ`[Y[Yb`JYf_Y\fgi bZÀ``Y`j cfUb"`@Ui h`Y]bYf`Ghi X]Y`XYg \bgi fUb\W`\\bgh]hi hY`Zcf`<][\k Um`GUZYhm`f\\ GŁ`_ÒbbhYb`gc`\W\Y HYW\bc`c[]Yb`\Y`ZYbž`X]Y`5bnU\``gW\k YfYf`I bZU``j Yf`Yhni b[YbYf\YV`]W\`ni `fYXi n]YfYbž`k Ybb`g]Y`k Y]h'j YfVfY]hYh'i bX`f]W\h][Y]b[YgYhnh`k YfXYb"

; $YgY^gWXUZh^gWXY^5igk]f_ib[Yb^XYfHfU[OX]Y$

8]Y 'HfU[OX]Y '\ Uh'b]W\ h'bi f'X]Y 'i ba]hhY `V UfYb '5b[Y\ Of][Yb 'ghUf_ [Yhfc \(\text{ZY}\) b \text{z}gc b \text{XY}fb 'Ui \text{W\ 'X}]Y '; \ Ya \ Y]b \text{XY}b ']b '? c`i a \ V]Yb 'i b \text{X\ A YI]_c" 8 Yf' J Yf`i gh'gc 'j]Y `Yf'@Y V Yb ']b 'Y]b Ya 'Y]bn][Yb 'I b \text{ZU```hf}]\text{Zh} b]W\ h'bi f': Ua]`]Yb\text{z}gcb \text{XY}fb 'Ui \text{W\ 'Yb}[Y': fYi b \text{XYg_fY}]gY 'i b \text{X'X}]Y [YgUa \text{hY'; Ya Y]bgW\ UZh" 8]Y '? c``Y_h]j Y 'HfUi Yf'i b \text{X'XY}f'GW\ a Yfn\text{XYf'Ui g'gc`W\ 'Y]bYa 'i b \text{Yf\ UfhYhYb' J Yf`i gh'fYgi `h]Yfh\text{z}_ObbYb `Ub[Ub\ U`hYb \text{XY 'dgmW\ c`c[]g\W\ Y'i b \text{X'gcn}]U`Y '5i gk]f_i b[Yb\ \UVYb"

8]Y']b'X]YgYf'; YgW\]W\hY'Yfk À\bhYb': Ua]']Yb'\UVYb'VYfY]hg
VY[cbbYbžY]bY'GdYbXYbU_h]cb']bg'@YVYb'ni 'fi ZYbži a 'X]Y
?cghYb'ZØf'6YYfX][i b[Yb'i bX'a YX]n]b]gW\Y'6Y\UbX'i b['ni
XYW_Yb'''Gc'W\Y'5_h]cbYb'g]bX']b'?f]gYbnY]hYb'b]W\hi b[Yk Ò\b']W\
i bX'nY][Ybž'k]Y'; Ya Y]bgW\UZhYb'ni gUa a Yb_ca a Ybži a 'Bch'ni
']bXYfb'i bX'I bhYfghØhni b['ni 'V]YhYb'''5i W\']b'gcn]U'Yb'A YX]Yb
k]fX'X]Y'; YgW\]W\hY'XYf'6YhfcZZYbYb'cZh'[YhY]'hž'k cVY]'j]Y'Y
Bi hnYf']\fY'; YXUb_Yb'i bX']\f'A]h[YZØ\`'ZØf'X]Y'hfUi YfbXYb
: Ua]']Yb'VY_i bXYb''8]Yg'gW\UZZh'Y]b'; YZØ\`'XYf'Gc`]XUf]hÀh'i bX
J YfVi bXYb\Y]h'i bhYf'XYb'A YbgW\Ybž'X]Y'À\b`]W\Y'9fZU\fi b[Yb
[Ya UW\h'\UVYb'cXYf'g]W\']b'Y]bY'UbXYfY': Ua]']Y'\]bY]bj YfgYhnYb
_ObbYb"

8]YgY'HfU[OX]Y'i bX'X]Y'UbgW\`]Y»YbXYb'FYU_h]cbYb
i bhYfghfY]W\Yb'X]Y'6YXYi hi b['j cb'J cfg]W\hga U»bU\a Yb']a
GhfU»Ybj Yf_Y\fž'i a 'gc`W\Y'JcfZ\``Y']b'Ni _i bZh'ni 'j Yf\]bXYfbž
i bX'g]Y'k YW_Yb'Ui W\'Y]b'6Yk i gghgY]b'XUZØfž'XUgg'X]Y
<]bhYfV`]YVYbYb'I bhYfghØhni b['VYbOh][Ybž'i a 'X]YgY'gW\k]Yf][Y

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. 'b!U["XY