

@c_U`Y`Dc`]nY]Y]bgÀhnY. 5igY]bUbXYfgYhnib[Ybž'IbZÀ``Y'ibX : `iW\hjYfgiW\Y

BUWX '? bY]dYbghfY]h'i bX'J Yf_Y\fgghfUZhUhYb. 'Dc`]nY]'@]a Vi f[Yfa]hhY`h']b'a Y\fYfYb'JcfZÀ``Ybž'XUfi bhYf'A chcffUXi bZU`` i bX'ZØWXh][Yg': U\fnYi ["

@a Vi f['fkhgk

J]Y`ZÀ`h][Y'JYf_Y\fgi bZÀ``Y'i bX'8Y`]_hY']b @]a Vi f[.'9]bY'5bU`mgY

± XYb ``YhnhYb `HU[Yb `k i fXYb `]b `@]a Vi f[`a Y\fYfY `Nk]gW\Yb ZÀ ``Y
[Ya Y`XYhž'X]Y `Ui Z'Y]b `VYgcf[b]gYffY[YbXYg'JYf\U`hYb `]a
GhfU» Ybj Yf_Y\f'i bX `nk]gW\Yba YbgW\`]W\Y `?cbZ`]_hY `\]bk Y]gYb"
8]YgY `K cW\Y 'V`Y]Vh `UVYf `b]W\ h'bi f `k Y[Yb `XYf `J Yf_Y\fgg]W\Yf\Y]h
]b `9f]bbYfi b[ž'gcbXYfb `Ui W\ `Xi fW\ `X]Y `< YfUi gZcfXYfi b[Ybž'X]Y
X]Y `Dc`]nY]UfVY]h'a]h'g]W\ `Vf]b[h"

$8]Y^6YXYihib[^ijcb^iJYf_Y\fgg]WXYfY]h$

9]bYf'XYf'Ui ZZÀ``][ghYb'JcfZÀ``Y'YfY][bYhY'g]W\'Ua
GUa ghU[a cf[Ybž'U`g'Y]b'Fc``YfZU\fYf'c\bY'<Y`a ']b'XYf
: f]W_\cZYbYf'GhfU» Y'j cb'XYf'Dc`]nY]'[Yghcddh'k YfXYb'gc``hY"'8Yf
'-!'À\f][Y'A Ubb'Ui g'8cfbVi f['j Yfgi W\hYž'g]W\'Xi fW\': `i W\h'XYf
?cbhfc``Y'ni 'Ybhn]Y\Yb"'9f'\UhhY'cZZYbg]W\h`]W\'_Y]bY'[Ø`h][Y
: U\fYf`Ui Vb]g'cXYf'JYfg]W\Yfi b['ZØf'gY]b': U\fnYi ["'8]YgYf
JcfZU``'i bhYfghfY]W\h'X]Y'Bchk YbX][_Y]h'ghfYb[YfYf'FY[i `Uf]Yb
i bX'?cbhfc``Yb']a 'GhfU» Ybj Yf_Y\fž']bgVYgcbXYfY']a '<]bV`]W_'Ui Z

XYb`l a [Ub['a]h'8fc[Yb`i bX`5`_c\c`"'8Yf`A Ubbž'XYf`i bhYf`XYa 9]bZi gg`VYfUi gW\YbXYf`A]hhY``ghUbXž'k i fXY`ZYgh[Ybca a Yb`i bX a i gghY`Y]bY`6`i hYbhbU\a Y`ØVYf`g]W\`Yf[Y\Yb``UggYb"'Gc`W\Y : À``Y`j YfXYi h`]W\Ybž'k]Y`k]W\h]['J Yf_Y\fgg]W\Yf\Y]h`ZØf`XUg`K c\`XYf'; Ya Y]bgW\UZh`]gh"

JcfZÀ``Y`]b'XYf'BUW\h.'?cbZ`]_hY`]b'XYf; Ya Y]bgW\UZh

6YfY]hg'Ua 'ZfØ\Yb'GUa ghU[a cf[Yb'_Ua 'Yg'ni 'Y]bYf'_ÒfdYf`]W\Yb 5i gY]bUbXYfgYhni b[']b'Y]bYf'?bY]dY']b'9`n"'8]Yg'nY][hž'k]Y gW\bY``'j YfVU`Y'GhfY]h][_Y]hYb']b'[Yk U`hgUa Y'?cbZ]_hY i a gW\`U[Yb'_ÒbbYb"'Nk Y]'DYfgcbYb'k]YgYb'`Y]W\hY'JYf`Yhni b[Yb Ui Z'i bX'a i gghYb'j ca 'FYhhi b[gX]Ybgh'ni f'9fghj Yfgcf[i b[VY\UbXY`h'k YfXYb"'<]Yf'ghY``h'g]W\'X]Y': fU[Yž'k Y`W\Y DfÀj Ybh]cbga U» bU\a Yb'Yf[f]ZZYb'k YfXYb'_ÒbbYbž'i a 'gc`W\Y 5[[fYgg]cbgUi gVfØW\Y'ni 'j Yf\]bXYfb'i bX'X]Y'G]W\Yf\Y]h']a BUW\h`YVYb'ni 'Yf\`O\Yb"

A chcffUXi bZU``. $\mathcal{O}(W_{\underline{a}})$ a 'I b[$\mathcal{O}(W_{\underline{a}})$

5b Y]bYa 'UbXYfYb 'HU[Z'GcbbhU[Z'XYb '\$ ("'5i [i ghz'j Yf'cf'Y]b A chcffUXZU\fYf'Ui Z'XYf'@' \$&&']b 'Fi b_Y`'X]Y'?cbhfc``Y'ØVYf'gY]b : U\fnYi ['i bX'ghØfnhY"'8]YgYf'J cfZU``'U\a h'XUg'\Ài Z][Y'A i ghYf j cb'A chcffUXi bZÀ``Yb 'bUW\z'X]Y'cZh'Xi fW\'Ài » YfY'6YX]b[i b[Yb k]Y'bUggYg'K YhhYf'j Yfi fgUW\h'k YfXYb"'Ni bÀW\gh'VYghUbX'X]Y Gcf[Y'i a 'gW\k YfY'J Yf`Yhni b[Ybz'XcW\'X]Y'YfghYb'a YX]n]b]gW\Yb I bhYfgi W\i b[Yb'nY][hYb'[`ØW_`]W\Yfk Y]gY'bi f``Y]W\hY J Yf`Yhni b[Yb''8]YgY'G]hi Uh]cb'j YfXYi h`]W\h'X]Y'5bZÀ``][_Y]h'j cb A chcffUXZU\fYfb'ZØf'GhØfnY'i bX'X]Y'6YXYi hi b['j cb G]W\Yf\Y]hggW\i `i b[Yb'i bX'5i Z_`Àfi b['ØVYf'K YhhYfVYX]b[i b[Yb i bX': U\fq]W\Yf\Y]h"

8]Y'Gdif'XYg': `ØW\h][Yb.'JYfZc`[ib[gZU\fh]b'6UX'7UaVYf[

9]b k Y]hYfYf J cfZU```YfY][bYhY g]W\]b 6UX 7 Ua VYf[\check{z} k c Y]b

: `ØWk h][Yf'D_k ž'Y]b'6A K ž'bUWk 'Y]bYf'J YfZc`[i b[gZU\fh'Ua 'J cfhU[k]YXYf'Ui Z[YZ bXYb'k i fXY"'8]Y 'Yfa]hhY`bXYb'6YUa hYb'Yf\]Y`hYb Y]bYb'YbhgWk Y]XYbXYb'<]bk Y]g'Ui g'XYf'6Yj Ò`_Yfi b[ž'XYf'ni f G]Wk YfghY``i b['XYg': U\fnYi [g'ZØ\fhY"'8 Ug'nY][hž'k]Y'k]Wk h]['X]Y Ni gUa a YbUfVY]h'nk]gWk Yb'Dc`]nY]'i bX'6Øf[Yfb']ghž'i a J YfVfYWk YbgVY_Àa dZ b['YZZY_h]j 'ni '[YghU`hYb"'8]Y'9fa]hh`i b[Yb]b'X]YgYa ': U``'[Y\Yb'k Y]hYf'i bX'i bhYfghfY]Wk Yb'X]Y'bchk YbX][Y K UWk gUa _Y]h'XYf'; Ya Y]bgWk UZh''

$5\c\c)g]YfhYfFUXZU\fYfghØfnh$

9]bY'k Y]hYfY'5`Ufa]Yfi b['Yf\]Y`hYb'X]Y'6YUa hYb']b'@Ò\bVYf[ž'k c Y]b'&*!'À\f][Yf'FUXZU\fYf'bUW\'Y]bYa 'Ghi fn'i bhYf'XYa '9]bZi gg j cb'5`_c\c`i bX'6YhÀi Vi b[ga]hhY`b'a YX]n]b]gW\Y'<]`ZY VYbOh][hY"'8Yf'5hYa U`_c\c`hYgh'Yf[UV'Y]bYb'K Yfh'j cb'ØVYf'% Dfca]``Y"'8]YgYf'J cfZU``nY][hž'XUgg'b]W\h'bi f'a chcf]g]YfhY JYf_Y\fghY]`bY\a Yf'[YZÀ\fXYh'g]bXž'gcbXYfb'Ui W\'FUXZU\fYfž'X]Y g]W\'b]W\h'Ub'X]Y'[Y`hYbXYb'G]W\Yf\Y]hgj cfgW\f]ZhYb'\U`hYb"'8Yf : U```ZØ\fh'ni f'8]g_i gg]cb'ØVYf'X]Y'Bchk YbX][_Y]h'j cb'5i Z_`Àfi b[ØVYf'8fc[Yb!'i bX'5`_c\c`_cbgi a ']a 'GhfU» Ybj Yf_Y\f"

; Ya Y]bgUa Y J YfUbhk cfhi b[

8]Y '9fY][b]ggY 'X]YgYf'K cW\Y'cZZYbVUfYb'Y]b'[YZÀ\f`]W\Yg'A i ghYf
]a 'GhfU» Ybj Yf_Y\f'i bX']a 'I a [Ub['XYf'A YbgW\Yb'a]hY]bUbXYf"
6Yk i gghYg'i bX'j YfUbhk cfhi b[gj c``Yg'J Yf\U`hYb'U``Yf
J Yf_Y\fghY]`bY\a Yf'i bX'6Øf[Yf']gh'YbhgW\Y]XYbXž'i a 'X]Y
G]W\Yf\Y]h']b'XYf'; YgY``gW\UZh'ni '[Yk À\f`Y]ghYb"'9g']gh'gck c\``X]Y
DZ]W\h'XYf'G]W\Yf\Y]hgVY\ÒfXYb'U`g'Ui W\'XYf'; Ya Y]bgW\UZhž
Ui Za Yf_gUa 'ni 'V`Y]VYb'i bX'[YY][bYhY'A U» bU\a Yb'ni 'Yf[fY]ZYbž
i a 'X]Y'<Ài Z][_Y]h'gc`W\Yf'J cfZÀ``Y'ni 'fYXi n]YfYb'i bX'XUg
Ni gUa a Yb`YVYb']b'@a Vi f['ni 'j YfVYgqYfb"

.

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