

: ØbZ'XYf'gW\`YW\hYghYb'9H:! DYfZcfa UbW\g']a 'YfghYb'>U\f'g]bX _fmdhcVYnc[Yb

?fmdhcVÒfgYb[Y\UbXY`hY:cbXgʻa UW\YbʻZØbZʻXYfʻg]YVYbgW\YW\hYghYbʻ8YVØhgʻ]bʻXYfʻ; YgW\]W\hYʻXYfʻ9H:!6fUbW\YUig"8]YʻcbXgʻkifXYbʻ]bʻXYbʻVYfUigW\YbXYbʻHU[YbʻXYg\J\fYgʻ&\$&%'UiZ[Y`Y[h``[YfUXY`fYW\hnY]h][žʻXUa]hˈg]Yʻg]W\XYfʻjc``YbʻKiW\hXYfʻAUf_hkihjcbʻ&\$&&*ghY``Ybʻ_ObbYbžk]Y`X]Y`8UhYbʻjcbʻAcfb]b[ghUfʻ8]fYWhʻnY][Yb"·8]Y\9f[YVb]ggY`Uigʻ8UhYbžX]Y`Yl_`ig]jʻZØf`X]Y`:]bUbWJU``H]aYgVYfY]h[YghY``h'kifXYbžʻgW\`]Y»YbʻX]Y`KYfhYbhk]W_`ib[jcb[Y\YVY`hYbʻibX`]bjYfgYbʻ:cbXgʻUigž`X]Y`b]W\hXUfUiZUig[Y`Y[hˈg]bXž``Ub[Zf]gh][`[Y\U`hYbʻnikYfXYb"'5``Y`ZØbZ_cbnYbhf]YfhYbʻg]W\UiZ`XYb`Y]bgh`\cW\Z]Y[YbXYb?fmdhckÀ\fib[ggY_hcf`cXYf`XUgʻjYfkUbXhY`:Y`X`XYf6`cW_W\U]bž`]b`Y]bYf`bYiYb'JYfUbgW\Ui`]W\ib[U_UXYa]gW\Yf`6Y\Uidhib[YbžXUggʻh\YaUh]gW\Y\/Uad^\Y``]d/

? fmd hc V $OfgYb[Y \setminus UbXY \cap Y : cbXg : a UWXYb : ZØbZ : XYf : g]Y V Y b gWX `Y WX hY ghY b : 8 Y V Ø hg :]b : XYf : Y gWX]WX hY : XYf : 9 H: ! 6 f Ub WX Y : Ui g " : 1 g = 1 g$

8]Y:cbXg'kifXYb']b'XYb'VYfUigW.YbXYb'HU[Yb'XYg'*J\fYg'&\$&%UiZ[Y`Y[h''[YfUXY'fYW\hnY]h][ž'XUa]h'g]Y'g]W'XYf'jc``Yb'KiW\hXYf'AUf_hkih'jcb'&\$&&'ghY``Yb'_ObbYbž'k]Y'X]Y'8UhYb'jcbAcfb]b[ghUf'8]fYWh'nY][Yb"

8]Y'9f[YVb]ggY'Ui g'8UhYbž'X]Y'Yl _`i g]j 'ZØf'X]Y':]bUbW]U`'H]a Yg VYfY]h[YghY``h'k i fXYbž'gW\`]Y» Yb'X]Y'K YfhYbhk]W_`i b['j cb [Y\YVY`hYb'i bX']bj YfgYb': cbXg'Ui gž'X]Y'b]W\h'XUfUi Z'Ui g[Y`Y[h g]bXž``Ub[Zf]gh]['[Y\U`hYb'ni 'k YfXYb" 5``Y`ZØbZ'_cbnYbhf]YfhYb`g]W\`Ui Z`XYb`Y]bgh`\cW\Z]Y[YbXYb?fmdhck À\fi b[ggY_hcf`cXYf`XUg`j Yfk UbXhY`: Y`X`XYf`6`cW_W\U]bž]b`Y]bYf`bYi Yb`JYfUbgW\Ui`]W\i b[`U_UXYa]gW\Yf`6Y\Ui dhi b[YbžXUgg`h\Ya Uh]gW\Y`: cbXg`XUni `bY][Ybž`bU\Y`XYa `<Ò\Ydi b_h]\fYg`H\Ya Ug`Ui Zni `Y[Ybž'_i fn`VYj cf`X]Y`FYbX]hYb`bUW\`GØXYb[Y\Yb"

GdYn]U`]g]YfhY '9H: g'k YfXYb'_i fn'bUW\'XYa '< O\Ydi b_h'XYf 5i ZfY[i b['i a 'VY`]YVhY '5b`U[Yh\ Ya Yb'Ui Z[Y`Y[h"' \pm b'XYb' \pm J\ fYb bUW\'XYf'9]bZØ\ fi b['j Yf`cfYb'X]Y'ni [fi bXY'`]Y[YbXYb JYfa O[Ybgk YfhY'Y]bYb'HY]`']\ fYf'UbZ\\deltab[`]W\Yb', VYfVYk Yfhi b[ž YVYbgc'k]Y'X]Y'DfY]gY'gdYn]U`]g]YfhYf'9H: g ž'gW\\f]YVYb'FUV]\ A ci ggUk]'i bX'?c``Y[Yb']b'Y]bYf'k]ggYbgW\UZh`]W\Yb'5fVY]hž'X]Y Yfgha U`g']a 'j Yf[Ub[YbYb' \pm J\ f'j YfOZZYbh`]W\h'k i fXY"

GdYn]U`]g]YfhY`9H: g`gWXY]bYb`ZØf`ØVYfcdh]a]gh]gWXY`5b`Y[Yf
[YY][bYh'ni 'gY]b ž'gU[hY`A ci ggUk]ž'Ui » YfcfXYbh`]WXYf`DfcZYggcf
ZØf':]bUbnYb`Ub`XYf'J]``Ubcj U`I b]j Yfg]hm`]b`DYbbgm`j Ub]U"

8 Yf 'ghUf_'[Y\ md hY 'DfcG\ UfYg'6]hWc]b 'GhfUhY[m'9H: 'f6 \delta Lz'XYf']b XYb '%& 'A cbUhYb 'bUW\ 'gY]bYf'a]h'GdUbbi b['Yfk UfhYhYb 9]bZØ\ fi b[']a 'C_hcVYf'&\$&%'Y]bY'FY_cfXgi a a Y'j cb'%ž& A]``]UfXYb'8c``Uf'Ub'5b`Y[Yf[Y`XYfb'j Yf`cfž'\ Uh'j]Y`Y'GW\ `U[nY]`Yb [Ya UW\ h"

5a 'gW\`YW\hYghYb'gW\\b]hh`XYf']b': fUb_fY]W\`Ubg\`Agg][Y'A Y`Ub]cb 6H7'9ei]h]Yg'l b]j YfgY'l W]hg'9H: 'fl F\$\$%(\$\$&\infty \xi\) 1 b \\Y'l bhYfbY\\\ a Yb'\\\ \]Y'\\A UfUh\\\cb'\\\\\] []hU`'\< c`\X]b[gž'\ F]ch 6`\c\W\\\U]b'i b\X'\\\\\ \]WfcGhfUhY[m']bj Ygh]Yfh"

9g'k i fXY']a 'C_hcVYf'&\$&%'Y]b[YZØ\fhž']a 'gY`VYb'A cbUh'k]Y'6 \pm lC i bX'bi f'k Yb][Y'K cW\Yb'j cf'XYa '< \dot{O} \Ydi b_h'XYf'[`cVU`Yb

AÀf_hYž'bi f'i a ']b'XYb'Zc`[YbXYb'%&'AcbUhYb'i a '+* ž- 'DfcnYbh Y]bni VfYWXYb"

 $9VYbgc `VfUW\ `XYf']b `XYb'| G5 `bch]YfhY'; `cVU``L `6`cW_W\U]b `9H: fb? 7 < ½`XYf']a `$\; `]``YhnhYb `$U\fYg']bg'F YbbYb'[]b[ž']b `gY]bYa YfghYb `6Yhf]YVg'U\f'i a `+* ž+ `DfcnYbh'Y]b"$

#bj YgWc '5 `Yf]Ub '; U`UI m'7fmdhc '9Wcbca m'9H: 'fG5HCŁž'Y]b
k Y]hYfYg '≯ b[h]Yf'j ca 'C_hcVYf'&\$&%ž'`U['b]Wkh'k Y]h'XU\]bhYf'i bX
gUb_'i a '+' ž+ 'DfcnYbhž'k À\fYbX'XYf':]fgh'Hfi gh'G_m6f]X[Y'7fmdhc

#bXi ghfm'UbX'8][]hU`'9Wcbca m'9H: 'ff7FDHŁ']b'XYb''%&'A cbUhYb'V]g
GYdhYa VYf'X]YgYg'∜J\fYg'* - ž('DfcnYbh'j Yf_Ui ZhY'"

6`cW_WXU]b! ±bj Ygh]h]cbYb`g]bX`Yb[`a]h`6]hWc]b`i bX ?fmdhck À\fi b[`]a `5``[Ya Y]bYb`j YfVi bXYbž`UVYf`g]Y`VYf[Yb`Y]b ni gÀhn`]WXYg`5_h]Ybf]g]_c ž`gU[hY`HcXX`FcgYbV`i h\ž : cfgWXi b[g`Y]hYf`VY]`XYf`6YfUhi b[gZ]fa U`J YhhU:]"

I bhYfbY\a Ybž'X]Y'a]h'XYa 'VfY]hYb'² _cgmghYa 'j YfVi bXYb'g]bXžghUbXYb'j cf'<YfUi gZcfXYfi b[Ybž'XU'XYf'DfY]g'j cb'6]hWc]b'ghUf_
[YZU``Yb']gh'i bX'X]Y'BUWXZfU[Y'bUWX'XYf'HYWXbc`c[]Y'b]WXh'gc
gWXbY```[Yk UWXgYb']ghž'k]Y'j cb'*bj YghcfYb'Yfk UfhYh'''G]Y'k YfXYb
[YbUi gc'cXYf'gc[Uf'bcWX'ghÀf_Yf'VYghfUZh'U`g'6]hWc]b!:i hi fYg!
VUg]YfhY'DfcXi _hY'gY`Vgh ž'ZØ[hY'Yf'\]bni "

8]Y Y]bn][Yb'UbXYfYb'b]W\h'[Y\YVY`hYb'cXYf']bj YfgYb'9H: gž'X]Y
Y]b'gW\`YW\hYfYg'YfghYg'\J\f'\UhhYb'U`g'6\HC\ž'g]bX'XYf'L hfUW_Yfg
A G7=Fi gg]U'7UddYX'Gk Ud'9H: 'fL A F8\Lz'XYf']a '\J\f'V]g
8YnYa VYf'\&\\$\, '+\) \z'\DfcnYbh'j Yf`cfz'U`g'XYf'Fc\ghc\Z\]
Gi dYfnm_`i g'ni gUa a YbVfUW\\z'i bX'?UbUXUg'<cf]ncbg'l G!
A Uf]\i UbU!9H: 'fk A I G\Lz'VY]'XYa '\&\\$'-!\&\\$'+\) \z'\DfcnYbh'gY]bYg
J Yfa O[Ybg']b'FUi W\'Ui Z[]b[Yb"

±b 'Y]bYf'8Ya cbghfUh]cb 'XYf'F]g]_Ybž'X]Y 'a]h'XYa '<U`hYb'j cb [Y\YVY`hYb'i bX']bj YfgYb'JY\]_Y`b'ØVYf'Y]bYb'`Ub[Yb'NY]hfUi a j YfVi bXYb'g]bXž'k i fXY'`Ui h'A cfb]b[ghUf'XUg'gW\'YW\hYghY 8YVØh'U\f'U``Yf'NY]hYb'ZØf'Y]bYb'9H: 'j cb'XYa ']b'8i V`]b UbgÀgg][Yb'VÒfgYb[Y\UbXY`hYb'Fc\ghcZZ'@Yj YfU[Y'G\UfYg'' I

XXYfž:XYf:XYb::cbXg:gY]h:XYa 'GhUfh'j cb'FC?' ']a '¾ b]'&\$&%'%&
A cbUhY '`Ub['[Y\U`hYb'\ÀhhYž\ÀhhY'---ž-&'DfcnYbh'gY]bYg'; Y`XYg
j YfXUa dZYb'gY\Ybž'k Ug'XYb'FØW_[Ub['XYg'5_h]Yb_i fgYg'XYf'I G!
GhfYUa]b[!D`UhhZcfa 'i a '+*'DfcnYbh'k À\fYbX'XYg'NY]hfUi a g
bcW.'j YfghÀf_h'\ÀhhY"'

8]Y'8UhYb'jcb'Acfb]b[ghUf'XYihYb'YXcW\'UiW\'XUfUiZ'\]bž'XUgg Y]b'gW\fYW_`]W\Yg'YfghYg'\J\f'b]W\h'ibVYX]b[h'X]Y'HchYb[`cW_Y'ZØf Y]bYb':cbXg'`ÀihYb'aigg"

8 Yf'GD8 F'DcfhZc`]c'G/D') \$\$'; fck h\'9H: 'fGDM &'Z]Y`']b'gY]bYa YfghYb'< UbXY`g'U\f'&\$\$\$!&\$\$%'i a ')' ž 'DfcnYbhž'\Uhrg]W\'UVYf gY]hXYa 'k]YXYf'Yf\c`h'i bX']gh'ni 'Y]bYa '%&ž&!A]``]UfXYb!8c``Uf! : cbXg'[Yk cfXYb"

9VYbgc 'VfUW\ 'XYf']G\UfYg'; `cVU`'7`YUb'9bYf[m'9H: 'f⊨7 @BŁ']b'XYb
⅓\\fYb'&\$\$,!&\$\$-'ia')*'DfcnYbh'Y]bž'j YfZØ[h'UVYf'Yhnh'ØVYf'Y]b
JYfa Ò[Yb'jcb'(ž)'A]``]UfXYb'I G!8c``Ufž'i bX'XYf'♣j YgWc'Gc`Uf
9H: 'fH5BŁ'VfUW\']a 'gY`VYb'⅓\\f'ia'*, ž&'DfcnYbh'Y]bž'\À`h'UVYf
Yhnh'&ž&'A]``]UfXYb'I G!8c``Uf"'Gc[Uf'DfcG\UfYg'\Uh'XUa]h
9fZU\fi b[/'gY]b'I`hfUDfc'G\cfh'E E E 'fGE E E Ł'j YfZØ[h'Yhnh'ØVYf
Y]b'JYfa Ò[Yb'jcb'(ž, 'A fX"'I G8ž'cVk c\`'Yf'&\$%\$!&\$%*'*, ž%
DfcnYbh'j Yf`cf"'

?YbbYh\ '@Ua cbhž'GYb]cf': i bX'5bU`mgh'ZØf'dUgg]j Y'GhfUhY[]Yb'VY] A cfb]b[ghUfž'[`Ui VhYž'XUgg'XYf'?fmdhcgY_hcf'Y]b'k Y]hYfYf'GY_hcf

gY]b - ObbhYžXYfg]WX Yf c Yb - ObbhY"

8]Y @Yi hYža]h XYbYb]W gdfYW YžX]Y]b 6]hWc]b]bj Ygh]YfYbžg]bX]a a Yf bcW ni j Yf Agg][cdh]a]gh]gW žk Y] g]W X]Y dchYbn]Y `Yb 5bk YbXi b[gZA `Yb]W h [YAbXYfh \ UVYb žgU[hY @Uacbh"

J]Y`Y`6fUbW\YbU_hYi fY`\UVYb`g]W\`[YfUXY`ZØf`XYb`bÀW\ghYb 6i ``Yb`Ui Z'j YfgUa a Y`h"`CV`XUg`Y]bhf]ZZh`cXYf`b]W\hž`k Yf`k Y]» ž UVYf`k Ybb`Yg`Y]bYb`=bj Ygha Ybh`7UgY`ZØf`6]hWc]b`[]Vhž`k]fX j]Y``Y]W\h'Y]b'; `Y]W\[Yk]W\h'[YZ]bXYb"

EiY``Y.:]bUbW]U``H]a Yg

8 YhU1`c

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. '_fmd hc!bYk g"Uh