

HcV]Ug'A c\f.'J ca ': `cd'ni a GWX`ØggY`gd]Y`Yf'VY]a ': 7'GWXU`_Y'\$(

HcV]UgʻA c\fʻØVYffUgW\hʻ]a ʻGW\U`_Y!A]hhY`ZY`Xʻi bXʻghÀf_h?UXYfd`UbYfʻ6YbʻA Ub[Uʻ]bʻXYfʻgW\k]Yf][YbʻHfUbgZYfgU]gcb&&&("

; Y`gYb_]fWXYb` '8Yf': 7'GWXU`_Y`\$('gcf[h'VYfY]hg'ni '6Y[]bb`XYfbYi Yb'GU]gcb']b'XYf'&"'6i bXYg`][U'ZØf'dcg]h]j Yg'5i ZgY\Ybž'i bXXXUg'j YfXUb_h'Yf'b]WXh'ni `Yhnh'HcV]Ug'A c\f"'8Yf'&-!'À\f][Y: 'Ø[Y`gd]Y`Yfž'XYf']b'XYf'j Yf[Ub[YbYb'GU]gcb'cZh']b'XYf'?f]h]_ ghUbXž'dfÀgYbh]Yfh'g]WX'U_hi Y``'U`g'GWX`ØggY`gd]Y`Yf'XYg'HYUa gi bX'a UWXh'Xi fWX'VYY]bXfi W_YbXY'@Y]ghi b[Yb'Ui Z'g]WXUi Za Yf_gUa "'BUWX'Y]bYf'Xi fWXk UWXgYbYb'NY]h'gY]h'gY]bYa K YWXgY`'j cb'<Y]XYb\Y]a 'ZØf'%Z%'A]``]cbYb'9i fc']a '\\\X\\$\\X\\$\X\YbXYb'GU]gcb'X]Y'7\UbWY'k U\\f[Ybca a Ybž'gY]bY?f]h]_Yf'Y]bYg'6YggYfYb'ni 'VY`Y\\fYb"

HfUi a ghUfh'ZØf'A c\f.'A]h'Y]bYa 'ZUbhUgh]gW\Yb'HfYZZYf'[Y[Yb 9]bhfUW\h'6fUi bgW\kY]['YfÒZZbYhY'Yf'X]Y'GU]gcb'ZØf'GW\U`_Y']bYa 'Y]bXfi W_gj c``Yb') .%!G]Y["'5i W\']a 'Dc_U`gd]Y`'[Y[Yb'5U`Ybhfi a dZhY'Yf'[fc>"Ui Zž']bXYa 'Yf'gck c\``Y]bYb'5gg]gh'`]YZYfhY'U`gUi W\'gY`Vgh'hfUZ"'HfU]bYf'?UfY`'; YfUYfhg'Ài > YfhY'g]W\'VY[Y]ghYfh Jcf'HcV]'a i gg']W\'XYb'<i h'n]Y\Yb"'=\W\'k]```]\b'VY\U`hYb"' 8]YgY K YbXi b['XYg'GW\]W_gU`g'ZØf'A c\f'_ObbhY'Ui W\'ZØf'X]Y?UXYfd`Ubi b['XYg'bYi Yb'ghUf_Yb'A UbbYg'VY]'GW\U`_Yž'6Yb A Ub[Už'j cb'6YXYi hi b['gY]b"

8]Y Fc``Y j cb 6Yb A Ub[U

6Yb'A Ub[Už'XYf'bYi Y'? UXYfd`UbYf'XYg': 7'GW\U`_Y'\\$(ž'j YfZc`[h Y]bYb'_`UfYb'i bX'hfUbgdUfYbhYb'?i fg"'9f'\Uh']b'gY]bYb'YfghYb K cWXYb']a '5a h'XYi h`]WX'[Ya UWXhž'XUgg'Yf'X]Y'@Y]ghi b[Yb'XYf Gd]Y`Yf'b]WXh'bi f']b'X]Y'J Yf[Ub[Yb\Y]h'Y]bcfXbYh" K Ug'\Yi hY']ghž]gh'\Yi hY''K Ug'[YghYfb'k Ufž'k Uf'[YghYfb ž'Yf_`ÀfhY'A Ub[Už'i bX gYhnh'XUa]h'Y]b'NY]WXYb'''9f'Yf_Ybbh'Ubž'XUgg'g]WX'Gd]Y`Yf k Y]hYfYbhk]W_Y`b'_ObbYbž'i bX'Yfa i h][h'X]YgYž']\fY'7\UbWY'ni bi hnYb'''A c\f'\Uh'X]YgY'6chgWXUZh'j YfghUbXYb'i bX'[]Vh'Ui Z'XYa D`Uhn'U``Ygž'i a 'gY]bY'Dcg]h]cb'ni 'ZYgh][Yb''

A Ub[Už'VY_Ubbh'ZØf'gY]bY'Y\f`]W\Y'?ca a i b]_Uh]cbž'\Uh'X]Y < YfUi gZcfXYfi b['Yf_Ubbhž'X]Y'Z]bUbn]Y``Yb'F Yggci fW'b'XYg J YfY]bg'YZZY_h]j 'ni 'bi hnYb"'5b[Yg]W\hg'XYf'Ub[YgdUbbhYb'@U[YXYg'? `i Vg']gh'Yg'YggYbn]Y``ž'XUgg'Y\Ya U`][Y'@Y]ghi b[ghfÀ[Yf']\f DchYbn]U``Ui ggW\ÒdZYbž'i a 'X]Y'A UbbgW\UZh'ni 'i bhYfghØhnYb" A c\f'gW\Y]bh'XYf'YfghY'Gd]Y`Yf'ni 'gY]bž'XYf'Ui g'X]YgYf D\]`cgcd\]Y'J cfhY]`Y'n]Y\h"

A c\fg'9bhk $]W_i b['ibX']\fY'6YXYi hib['ZØfXYb'7'i V$

8]Y '9bhk]W_`i b['j cb'HcV]Ug'A c\f']gh'b]W\h'bi f'ZØf']\b'gY`Vghž gcbXYfb'Ui W\'ZØf'XYb'JYfY]b'j cb'[fc» Yf'6YXYi hi b["'8Yf DfÀg]XYbh'i bX'UbXYfY'JYfUbhk cfh`]W\Y'k]ggYb'i a 'X]Y GW\k]Yf][_Y]hYbž'X]Y'X]Y'? UXYfd`Ubi b[']b'Y]bYf'gW\k]Yf][Yb Z]bUbn]Y``Yb'D\UgY'a]h'g]W\'Vf]b[h"'8cW\'k Ybb'Gd]Y`Yf'k]Y'A c\f]\fY': cfa 'Z]bXYbž'_Ubb'X]Yg'XYb'8fi W_'Ui Z'XYb'?`i V'j Yff]b[Yfb i bX'X]Y'Bchk YbX][_Y]h'k Y]hYfYf'hYi fYf'HfUbqZYfg'a]b]a]YfYb"

8]Y; YgW,]W,hY;]gh;b]W,h;bYi ž;k]Y;X]Y;9fZU\fi b[Yb;j cb;A Ub[U]b:fUb_Zi fh;nY][Yb":8cfh;Yf;YVhY;Yf;Y]bY;A\b`]W,Y;K YbXY;a]h;8U]W,]?Ua UXUž;XYf;g]W,YVYbZU;`g;]b;Y]bYf;5i gbU\a Ydcg]h]cb;nY][hYibX;gW,`]Y,x`]W,ini a 'GW,`ØggY`gd]Y;Yf;Uj UbW]YfhY":Gc;W,YG]hi Uh]cbYb;nY][Ybž;XUgg;Yg;cZh;X]Y;i bj cf\YfgY\VUfYbKYbXi b[Yb;]a ::i,xVU;;g]bXž;X]Y;YbhgW,Y]XYbX;ZØf;XYb;JYf;Ui ZY]bYf;GU]gcb;gY]b;_ObbYb"

: Øf 'HcV]Ug 'A c\f'_ObbhY 'g]W\ 'X]Y '7\UbW ž'X]Y ']\a 'X]Y 'bYi Y 'GU]gcb V]YhYhžni a '? Uff]YfY!6ccghYf 'Ybhk]W_Y `b" 'A]h 'gY]bYb VYY]bXfi W_YbXYb '@Y]ghi b[Yb'[]Vh 'Yf'b]W\h'bi f'; YfUYfhg'i bX A Ub [U'; fØbXY'ni f': fYi XYž'gcbXYfb'Vf]b [h'Ui W\'X]Y' < c \mathbb{Z} bi b [ni fØW_ž'XUgg'XYf': 7 'GW\U`_Y'\$ ('g]W\'Ui g'XYf'gdcfh`]W\Yb'A]gYfY VYZfY]Yb'_Ubbž'X]Y']\b']b'XYf'j Yf[Ub [YbYb'GU]qcb'[Yhfc \mathbb{Z} Yb'\Uh'

DYfgdY_h]j Yb i b X < c ZZbi b [Yb

8]Y ghY][YbXY @Y]ghi b[jcb'HcV]Ug'Ac\f'jYf'Y]\h'XYa: 7'GW\U`_Y\$(bYiYb'5iZk]bX"8Ug'HYUa'VYbOh][h'Gd]Y`Yfž'X]Y']b'_f]h]gW\YbAcaYbhYb'UiZ'XYa'D`Uhn'ØVYfnYi[Yb'_ObbYb"'Ac\f'_ObbhY']bX]YgYf'<]bfi bXY'XYf'YbhgW\Y]XYbXY: U_hcf'kYfXYbž'XYf'XYb'KY[ZØf'Y]bY'dcg]h]jY'9bhk]W_`ib['YVbYh''9g'V`Y]Vh'UVnikUfhYbž'cV'YfX]YgY'5iZkAfhghfYbX'\U`hYb'_Ubb'ibX'cV'Yf'XUni'VY]hfA[hž'X]Y6`Ui!KY]»Yb'Uig'XYb'H]YZYb'XYf'HUVY``Y'ni'ZØ\fYb"

8]Y '_ca a YbXYb 'Gd]Y `Y 'k YfXYb 'nY][Ybž'cV 'A c\f'i bX'gY]b 'HYUa XYb 'GW\k i b['\U`hYb '_ObbYb"'GW\U`_Yg': Ubg 'k YfXYb 'a]h G]W\Yf\Y]h [YgdUbbh'Ui Z'X]Y 'bÀW\ghYb '5i Zhf]hhY ']\fYg'HYUa g k UfhYbž']b 'XYf' < c ZZbi b[ž'XUgg'X]Y 'V]g\Yf][Yb '@Y]ghi b[Yb '_Y]b Y]ba U`][Yg'D\Àbca Yb'g]bX"

 $8]Y `U_hi Y``Y `G]hi Uh]cb `XYg`: 7 `GWW U`_Y `$(`]gh `ghUf_`[YdfA[hij cb XYb` < YfUi gZcfXYfi b[Ybž'X]Y `XYf'J YfY]b `]b `XYb `j Yf[Ub[YbYb $U\fYb `Xi fW `YVh`\Uh" B UW `XYa `5 Vgh]Y[`Ui g`XYf `6i bXYg`][U`]a $U\f`&$&%`\Uh'XYf`?`i V `gY]hXYa `a]h`Z]bUbn]Y``Yb `9b[dAggYb `i bX XYf `Gi WW Y `bUWW `gdcfh`]WW Ya `9fZc`[`ni `_Aa dZYb"' <math>\Rightarrow$ `XYf `nk Y]hYb 6i bXYg`][U`dfAgYbh]YfhYb `g]WW `X]Y `; Y`gYb_]fWW YbYf`]b `XYf :i » VU``gd]Y`nY]h`&\$&&#&\$&' `U`g`i b_cbghUbhii bX`Yf`YVhYb `Y]bYb ghAbX][Yb `? Ua dZ'[Y[Yb `XYb `5 Vgh]Y["'8 Yf`bYi Y `? UXYfd`UbYf`6Yb A Ub[U`g]Y\h`]b `HcV]Ug`A c\f`bi b`Y]bY`dcg]h]j Y`9bhk]\w_`i b[ž`X]Y b]WW h`bi f`Z\warphif `XYb`Gd]Y`Yf`gY`Vghž`gcbXYfb`Ui WW `Z\warphif `XYb`J YfY]b `j cb [fc » Yf`6YXYi hi b[`]gh"

A Ub[U'_ObbhY'Xi fWX'gY]bY'_Ø\bYb'9bhgWXY]Xi b[Yb'i bX'gY]bYa JYfhfUi Yb']b'hU`Ybh]YfhY'Gd]Y`Yf'k]Y'A c\f'k]WXh][Y'=a di `gY gYhnYbž'X]Y'XYa '?`i V'\Y`ZYbž'X]Y'Z]bUbn]Y``Yb'gck]Y'gdcfh`]WXYb < YfUi gZcfXYfi b[Yb'ni 'VYk À`h][Yb"'8]Y'Yb[Yb'Z]bUbn]Y``Yb Gd]Y`fÀi a Y'gYhnYb'X]Y'JYfUbhk cfh`]WXYb'i bhYf'8fi W_ž'k Yg\U`V X]Y': OfXYfi b['j cb'9][Yb[Yk ÀWXgYb'cXYf'Gd]Y`Yfb'a]h'[fc» Ya

DchYbn]U`Xf]b[YbX'YfZcfXYf`]WX']ghži a 'XYb'?UXYf'ni 'ghÀf_Ybž c\bY'[fc»Y'HfUbgZYfg'hÀh][Yb'ni 'a ØggYb"

DYfgdY_h]j Yb ZØf X]Y Ni _i bZh

A]h'XYf'dchYbn]Y``Yb'GhY][Yfi b['XYf'@Y]ghi b['j cb'HcV]Ug'A c\fg]bX'Ui W\'dcg]h]j Y'5i gk]f_i b[Yb'ZØf'X]Y'fYgh`]W\Y'A UbbgW\UZh'ni Yfk UfhYb"'K Ybb'Gd]Y`Yf'k]Y'A c\f'_cbh]bi]Yf`]W\']\f'DchYbn]U`Ui ggW\ÒdZYbž'_ÒbbhY'XUg'XYb'HYUa [Y]ghi bX'XUg'JYfhfUi Yb']bXYb'HfU]bYf'k Y]hYf'ghÀf_Yb"'9]bY'ghUf_Y'@Y]ghi b[']a '?UXYf'_Ubbni XYa 'UbXYfY'Gd]Y`Yf'a ch]j]YfYbž'g]W\'YVYbZU``g'ni 'ghY][Yfbž'k Ugni 'Y]bYf'Y]b\Y]h`]W\YfYb'i bX'gW\`U[_fÀZh][YfYb'A UbbgW\UZh'ZØ\fh"

9]b'k Y]hYfYf: U_hcfž:XYf'X]Y'9bhk]W_i b['XYg': 7'GW\U`_Y'\$(
Yf\YV`]W\'VYY]bZi ggYb'_\ObbhYž']gh'X]Y: Ubi bhYfghØhni b["'8]Y
Y]XYbgW\UZh`]W\'Yb'5b\\Ab[Yf'XYg'J YfY]bg'\UVYb'k \A\fYbX
gW\k]Yf][Yf'D\UgYb']a a Yf'k]YXYf']\fY'@cmU`]h\Ah'VYk]YgYb"'8]Yg
_\ObbhY'g]W\']b'ni _\ØbZh][Yb'GU]gcbg'U`g'YbhgW\Y]XYbXY'Gh\Af_Y
Yfk Y]gYb\z'k Ybb'Yg'XUfi a '[Y\h\z'\f b[Y'HU`YbhY'ni '\Z\OfXYfb'i bX'Y]b
ghUf_Yg'HYUa 'ni 'V]`XYb"'8]Y'I b[Yk]gg\Y]h'\ØVYf'X]Y'_\ØbZh][Y
gdcfh`]W\Y'@Y]ghi b[gZ\A\][_Y]h'XYg'? i Vg'k]fX'bUh\Øf`]W\'k Y]hYf\]b
VYghY\Yb\z'XcW\'X]Y'NY]W\Yb'XYi hYb'XUfUi Z\\]b\z'XUgg'Y]bY
dcq]h]j Y'9bhk]\W_i b['a \Oj[`]\W\']gh"

8 YhU]`g

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