

? O`bg`DUfhmncbY. 'GdYffncbY 'ZØf @Y]\fÀXYf'k A\fYbX'; Ua YgWca! K cWXYbYbXY

5a 'K cWXYbYbXY'[]`h']b'?Ò`b'Y]bY'GdYffncbY'ZØf @Y]\ZU\fnYi[Y']b'XYf'DUfhmncbY'XYg'; Ua YgWca ': Ygh]j U`g" 5WXhYb'G]Y'Ui Z'5VghY``\]bk Y]gY°

± XYf GhUXh? Ò b k]fX Yg Ub X]YgYa K cW YbYbXY Y]bY gdYn]Y`Y FY[Y`i b['ZØf'@Y]\ZU\fnYi [Y'[YVYbž'i a 'XYb'j cfUi gg]W h`]W \c\Yb 6Ygi W YfUbXfUb['k À\fYbX XYg'; Ua YgWca '7]hm: Ygh]j U`g ni 'VYk À`h][Yb"'5i Z[fi bX XYf A YbgW Yba Yb[Yž'X]Y'g]W 'Ui Z'XYa <c\Ybnc``Yfbf]b['i bX']a '6Y`[]gW Yb'J]YfhY`'j YfgUa a Y`b'k]fXž g]bX 'VYgh]a a hY '6YfY]W Y 'ZØf'@Y]\ZU\fnYi [Y'[YgdYffh"'8]YgY A U» bU\a Y'hf]hh'Ua 'GUa ghU[ž'XYa '&("'5i [i ghž'i bX'GcbbhU[ž XYa '&)"'5i [i ghž']b'?fUZh"

8]Y'VYhfcZZYbYb'NcbYb'i a ZUggYb'X]Y'GhfYW_Yb'nk]gW\Yb'XYa
Fi Xc`Zd`Uhn'i bX'XYa :: f]YgYbd`Uhn'gck]Y'nk]gW\Yb'XYf'6fUVUbhYf
GhfU»Y'i bX'XYa :: f]YgYbk U``"'=b'X]YgYb'6YfY]W\Yb']gh'Yg'b]W\h
Yf`Ui Vhž'@Y]\fÀXYfž'9!GWcchYf'cXYf'9!A cdYXg'UVni ghY``Yb"'8]Yg
XØfZhY'Ui W\'VY]'XYb'Bi hnYfb'XYf'? O`bYf'JYf_Y\fg!6Yhf]YVY'ff?J6Ł
ZØf'ni gÀhn`]W\Y'JYfk]ffi b['gcf[Ybž'XU'X]Y'FØW_[UVY'i bX'5i g`Y]\Y
j cb'?J6!FÀXYfb'YVYbZU``g'VYhfcZZYb']gh"

$K \]WX h][\ Y <]bk \ Y]gY \ ZØf F UX ZU \ fYf$

8]Y?Ò`bYf`JYf_Y\fg!6Yhf]YVY`Yf\]Y`hYb`XYb`5i ZhfU[ž`X]Y`Bi hnYf Ui gXfØW_`]W\`Ui Z`X]Y`bYi Yb`FY[Y`i b[Yb`Ui Za Yf_gUa ini ia UW\Yb" FUXZU\fYfž`X]Y`a]h`Y]bYa i?J6!FUX`i bhYfk Y[gig]bXžigc``hYb VYgcbXYfg`Ui Z'X]Y`@Yi W\hX]cXY`Ui Z'XYa iFØW_fUX`UW\hYb"'9]b [fØbYg`@]W\hig][bU`]g]Yfhž`XUgg`XUg`FUX`]a iYf`Ui VhYb`6YfY]W\ UV[YghY``h'k YfXYb'_Ubb"'=gh'XUg'@]W\h'YXcW\'fchža i gg'Y]b 5`hYfbUh]j ghUbXcfh'ZØf'XUg'5VghY``Yb'XYg'FUXYg'[Ygi W\h'k YfXYb"

: Øf`X]Y Yb][Ybž`X]Y `g]W\ `hfchnXYa `YbhgW\Y]XYbž`]\f`? J 6!F UX `]b
XYf`UV[YgdYffhYb`DUfhmncbY`UVni ghY``Ybž`_ÒbbhY`X]Yg`hYi Yf
k YfXYb"`9]b`GcbXYfYbh[Y`h'j cb`&\$`9i fc`k]fX`Ui hca Uh]gW\
Yf\cVYbž`k Ybb`XUg`: U\ffUX`b]W\h']b`Y]bYa `ni [Y`UggYbYb`6YfY]W\
[YdUf_h'k]fX"`8 Ug`VYXYi hYhž`XUgg`Y]bY`i bUW\hgUa Y`5VghY``i b[
gW\bY```]bg'; Y`X`[Y\Yb`_Ubb"

; $Yg_bhYfg^ZØf^X]Y^9jYbhg]hiUh]cb$

8 Ugʻ; Ua YgWca '7]hm: Ygh]j Uʻʻn]Y\hʻYXYgʻzU\fʻhUi gYbXYʻj cb 6Ygi W\YfbʻUbži bXʻX]YʻCf[Ub]gUhcfYbʻg]bXʻVYghfYVhžʻgck c\``XYb HY]ʻbY\a YfbʻUʻgʻUi W\`XYbʻ9]b\Y]a]gW\YbʻY]bʻg]W\YfYgʻi bX cf[Ub]g]YfhYgʻ9f`YVb]gʻni 'V]YhYb"·8]YʻGdYffncbYbʻg]bXʻHY]``XYf 6Ya Ø\i b[Ybž'X]YʻG]W\Yf\Y]hʻU``Yfʻ6YhY]`][hYbʻni '[Yk À\f`Y]ghYb" <c\Yfʻ: i »[Ab[Yfj Yf_Y\fʻi bX`XUgʻA]gW\Ybʻj cbʻ: i »[Ab[Yfbʻa]h : U\fYfbʻj cbʻ9`Y_hfca cV]`Ybʻ_ObbhYbʻni '[YZÀ\f`]W\YbʻG]hi Uh]cbYb ZØ\fYbžX]Yʻa]hʻXYfʻ9]bZØ\fi b[`X]YgYfʻA U» bU\a Ybʻa]b]a]Yfh k YfXYbʻgc``Yb"

: Øf'X]Y'? Ò`bYf'6Øf[Yf'_ÒbbhY'X]Yg'Y]bY'j cfØVYf[Y\YbXY I a ghY``i b['VYXYi hYbž'X]Y'YXcWX'bchk YbX][']ghž'i a 'X]Y'[fc» Yb A YbgWXYba Yb[Yb'i bX'XUg'JYf_Y\fgUi Z_ca a Yb'k À\fYbX'gc`WXVYXYi hYbXYf'JYfUbghU`hi b[Yb'YZZ]n]Ybh'ni 'ghYi Yfb"'6Ygi WXYf gc``hYb'g]WX'YbhgdfYWXYbX'j cfVYfY]hYb'i bX'Yj Ybhi Y``'Ui Z U`hYfbUh]j Y'HfUbgdcfha]hhY`'ni fØW_[fY]ZYbž'i a 'X]Y'VY`YVhYb NcbYb'ni 'i a [Y\Yb"

8]Y FY[Y`i b[Yb ZØf XUg K c W Yb Yb X Y g]b X 'U`gc 'b] W h'bi f Y]bY FYU_h]cb 'Ui Z'X]Y 'ni 'Yfk UfhYb XYb 'A Ybg W Yba Ugg Yb z 'gcb XYfb Ui W 'Y]b' <]bk Y]g XUf Ui Zz k]Y 'GhÀ Xh Y 'g] W 'Ubd Ugg Yb 'a Øgg Yb z i a a c XYfb Y 'A c V]`]hÀh i b X 'ghÀ Xh]g W Y 'J Yf Ubgh U`hi b[Yb 'a]h Y]b Ub XYf]b '9]b_`Ub['ni 'Vf]b[Yb " K À\fYb X 'g] W '? Ò`b 'Ui Z'XUg K c W Yb Yb XY j c f V Y f Y]h Yhz V `Y]Vh UV ni k Ufh Yb z k]Y 'X]Yg Y 'A U » b U\a Yb Ub[Ybca a Yb k Yf X Yb i b X k Y`W Y F Ø W_a Y`Xi b[Yb j c b X Yb B i hn Yfb X Y f @ Y]\ZU\fn Yi [Y _ca a Yb k Yf X Yb"

JYf_Y\fga UbU[Ya Ybh']b XYf =bbYbghUXh

8]Y '9]bf]W\hi b['j cb'GdYffncbYb']b'gh\Axh]gW\Yb'; YV]YhYb']gh'b]W\h bi f']b'? O`bz'gcbXYfb'Ui W\']b'j]Y`Yb'UbXYfYb'Gh\AxhYb'Y]b ni bY\a YbX'\\\Ai Z][Yg'D\\\\Abca Yb'''\=\bgVYgcbXYfY'VY]; fc*j YfUbghU'hi b[Yb'k]Y'XYa'; Ua YgWca'7]hm: Ygh]j U`'k]fX j Yfgi W\\\hz'Y]bY'\[\] VYf`Ughi b['XYf'OZZYbh`]W\Yb': `\AW\Yb'ni jYf\]bXYfb'i bX'X]Y'G]W\Yf\Y]h'XYf'6Ygi W\Yf'ni '[Yk\\\A\f`Y]ghYb'' 8]YgY'A U*bU\a Yb'_\ObbYb'Ui W\'U'\g'HY]`'Y]bYg'i a ZUggYbXYfYb 5bgUhnYg'ni f'GhUXhd`Ubi b['i bX'A cV]`]h\\\h'[YgY\Yb'k YfXYbz'XYf XUfUi Z'UVn]Y'\\\z'X]Y'Bi hni b['j cb'OZZYbh`]W\Yb'JYf_Y\fga]hhY`b'i bX U`\\YfbUh]j Yb'A cV]`]h\\\hgZcfa Yb'ni 'ZOfXYfb''

A $U \gg bU \approx Yb \sin f J Y f_Y \times fgg]WX Y f \times Y h$

? O`b`\Uh']b`XYf'JYf[Ub[Yb\Y]h'jYfgW\]YXYbY`AU» bU\aYbYf[f]ZZYbž'ia`X]Y`JYf_Y\fgg]W\Yf\Y]h'kÀ\fYbX`[fc» YfJYfUbghU`hib[Yb`ni`Yf\O\Yb"8Uni`[Y\OfYb`hYadcfÀfYJYf_Y\fgZØ\fib[Ybž'X]Y`6YfY]hghY``ib[`nigÀhn`]W\Yf`Dc`]nY]_fÀZhYgck]Y`X]Y`9]bgYhnib['jcb'G]W\Yf\Y]hgX]YbghYbž'ia`gckc\``X]YFY[]ghf]Yfib['jcb':U\fnYi[Yb'U`g'UiW\X]Y`8ifW\gYhnib['jcb'GdYffncbYb'ni`ØVYfkUW\Yb"8]YgY`GhfUhY[]Yb'gc``Yb'XUZØfgcf[Ybž'XUgg'gckc\``:i»[Àb[Yf'U`g'UiW\BihnYf'jcb':U\ffÀXYfbibX'9!GWcchYfb'g]W\Yf'UiZ'XYb'GhfU» Yb'bUj][]YfYb'_ObbYb"

$Y \setminus b^*WY^9fY][b]ggY^]b^UbXYfYb^GhAXhYb$

JYf[`Y]WXVUfY'AU»bU\aYb'kifXYb'UiWX']b'UbXYfYb'GhÀXhYb

]a d`Ya Ybh]Yfhž'VYgcbXYfg'k À\fYbX'[fc» Yf': Ygh]j U`g'cXYf GdcfhYj Ybhg" 6Y]gd]Y`gk Y]gY`\Uh'X]Y`GhUXh'6Yf`]b`k À\fYbX'XYf 6Yf`]bYf': Ug\]cb`K YY_ 'gdYn]Y``Y`GdYffncbYb'ZØf'@Y]\ZU\fnYi [YY]b[Yf]W\hYhž'i a 'A YbgW\YbUbgUa a `i b[Yb']b'VYgh]a a hYb GhUXhhY]`Yb'ni 'ghYi Yfb"'5i W\`\]Yf'k i fXYb'X]Y'Bi hnYf'XUfUi Z\]b[Yk]YgYbž'XUgg'XUg'5VghY``Yb']b'X]YgYb'NcbYb'a]h ni gÀhn`]W\Yb'; YVØ\fYb'j YfVi bXYb']gh"'Gc`W\Y'Jcf[Àb[Y'nY][YbY]bY'[Ya Y]bgW\UZh`]W\Y'5bghfYb[i b['ni f'Cdh]a]Yfi b['XYfqh\Xh]qW\Yb'A cV]`]h\Ah'i bX'G]W\Yf\Y]h"

2 ZZY b h`]WX Y 'K U\fbY\a i b['i b X 'B i hni b['j c b @Y]\ ZU\fnYi [Y b

8]Y Bi hni b['j cb @Y]\ZU\fnYi [Yb 'k]Y :: U\ffÀXYfb 'i bX '9!GWcchYfb \Uh']b 'XYb '`YhnhYb '\\ \J\fYb 'ghUf_'ni [Ybca a Ybž']bgVYgcbXYfY ']b ghÀXh]gW\Yb '; YV]YhYb "'8]YgY :: U\fnYi [Y 'V]YhYb 'Y]bY 'ZYI]V `Y i bX cZh'_cghYb[Øbgh][Y 'A Ò[`]W_Y]hž'g]W\ ']bbYf\U`V 'XYf'GhUXh'ni VYk Y[Yb ii bX 'k YfXYb ']bgVYgcbXYfY 'ZØf'_i fnY 'GhfYW_Yb '[Ybi hnh" 8]Y '? Ò`bYf'J Yf_Y\fg!6Yhf]YVY '\UVYb ']b 'X]YgYa 'Ni gUa a Yb\Ub[Y]bY 'VYXYi hYbXY 'F c ``Y 'ØVYfbca a Ybž']bXYa 'g]Y 'Y]b 'XYi h`]W\ g]W\ hVUfYg'i bX 'UbgdfYW\YbXYg'5b[YVch']a 'F U\a Yb']\fYf'?J6! F UX! \D\]h]Uh]j Y 'VYfY]hghY ``Ybž'XUg'Ui Z'i a k Y`hVYk i gghY 'A cV]`]hÀh UVn]Y 'h"

< YfUi gZcfXYfi b[Yb XYf @Y]\ZU\fnYi [!Bi hni b[</pre>

Hfchn'XYf'JcfhY]'Y'[]Vh'Yg'Ui W\'<YfUi gZcfXYfi b[Yb'a]h
@Y]\ZU\fnYi [Ybž']bgVYgcbXYfY'k Ug'X]Y'cfXbi b[g[Ya À» Y
5VghY'`i b['VYhf]ZZh"'C Zha U'g'g]Y\h'a Ub': U\fnYi [Yž'X]Y'i bni 'Àgg][
[YdUf_h'g]bX'i bX'X]Y'; Y\k Y[Y'V'cW_]YfYbž'k Ug'ni
I bUbbY\a `]W_Y]hYb'ZØf': i » [Àb[Yf'ZØ\fh"8]Y'9]bZØ\fi b['j cb
GdYffncbYb']gh'U'gc'Y]bY'X]fY_hY'FYU_h]cb'Ui Z'gc'W\Y
<YfUi gZcfXYfi b[Ybž'X]Y'XYb'GhUXhd`UbYfb'\Y'ZYb'gc'`ž'Y]b
Ui g[Yk c[YbYg'JYf\A`hb]g'nk]gW\Yb'XYf': ÒfXYfi b['bUW\\U`h][Yf
JYf_Y\fga]hhY'i bX'XYf'; Yk À\f'Y]ghi b['XYf'ÒZZYbh`]W\Yb
G]W\Yf\Y]h'ni 'Yfa Ò[`]W\Yb"

Ni_i bZhXYfghÀXh]gWXYbAcV]`]hÀh

A]h:XYf:ZcfhgWkfY]hYbXYb:I fVUb]g]Yfi b[:i bX:XYb:k UWkgYbXYb 5bZcfXYfi b[Yb:Ub:X]YghÀXh]gWkY:A cV]`]hÀh:g]Y\h:? O`b:]b:X]YgYb A U» bU\a Yb:b]Wkh:bi f:Y]bY:_i fnZf]gh][Y:@Ogi b[:ZØf JYfUbghU`hi b[Ybž:gcbXYfb:Ui Wk:Y]bYb:GWkf]hh:]b:F]Wkhi b[:Y]bYf bUWk\U`h][YfYb:ghÀXh]gWkYb:#bZfUghfi _hi f":#b]h]Uh]j Yb:ni f:OfXYfi b[:XYg:FUXj:Yf_Y\fg:i bX:XYf:Bi hni b[:j cb:9!GWcchYfb _ObbhYb:`Ub[Zf]gh][:Ui Wk:ni f:JYff]b[Yfi b[:j cb:JYf_Y\fgghUi g i bX:I a k Y`hgWkAXYb:VY]hfU[Ybž:]bXYa:X]Y:5V\Ab[][_Y]h:j ca]bX]j]Xi Y``Yb:A chcfj Yf_Y\f;j Yff]b[Yfh:k]fX"::Øf:X]Y:I a gYhni b[X]YgYf:J]g]cb:]gh:YXcWk:Y]b:i a ZUggYbXYg:?cbnYdh:i bX:X]Y:U_h]j Y A]hUfVY]h:XYf:6Øf[Yf:YfZcfXYf:]Wkži a 'Y]bY:g]WkYfY:i bX:YZZ]n]YbhY A cV]`]hAh:]b:XYf:GhUXh:ni:[YkA\f`Y]ghYb"

8 Y hU1`a

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