

BÀWAh`]WXYf'6fUbX']b'8fYgXbYf'BYi ghUXh. : Yi Yfk Y\f'fYhhYh'6Yk c\bYf

±b`XYf`8fYgXbYf`BYi ghUXh`VfUbbhY`Y]b`A Ø``fUi a `]b`XYf Df]Y»b]hnghfU»Y"'(\$': Yi Yfk Y\f`Yi hY'j Yf\]bXYfhYb GW\`]a a YfYg"'JYf`YhnhY'[UV'Yg'_Y]bY"

± XYf'8fYgXbYf'BYi ghUXhž'[YbUi Yf'[YgU[h'Ui Z'XYf]Df]Y»b]hnghfU»Yž'[UV'Yg']b'XYf'ZfØ\Yb'Acf[Ybghi bXY'Ua '8]YbghU[Y]bYb': Yi Yfk Y\fY]bgUhnž'XYf'X]Y'BUW\hfi \Y'j]Y`Yf'6Yk c\bYfUVfi dh'ghÒfhY"'I a 'Yhk U'' 'I \f'VfUW\']b'Y]bYa 'FUi a ž'XYf'ZØf'X]Y A Ø```U[Yfi b['[Ybi hnh'k i fXYž'Y]b': Yi Yf'Ui g"'8]Y'[YbUi Yb I a ghÀbXYž'X]Y'ni 'X]YgYa '6fUbX'ZØ\fhYbž'g]bX'V]g`Ub['i b_`Uf'i bX k YfXYb'j cb'XYb'9fa]hhìi b[qVY\ÒfXYb'i bhYfqi W\h"

8]Y 'YfghYb' <]bk Y]gY'_Ua Yb'j cb'VYgcf[hYb'5bk c\bYfbž'X]Y'XYb Ei U'a 'VYa Yf_hYb'i bX'i a [Y\YbX'X]Y': Yi Yfk Y\f'U`Ufa]YfhYb" BcW 'VYj cf'X]Y'DfcZ]g'j cf'Cfh'k UfYbž'j Yfgi WhYb'Y]b][Y'BUW VUfb]\f'6YghYgž'i a 'XYb'6fUbX'i bhYf'?cbhfc``Y'ni 'Vf]b[Yb"'8cW 'XUg : Yi Yf'VfY]hYhY'g]W 'fUgW 'Ui g'i bX'YffY]W hY']bbYf\U`V'_i fnYf'NY]h XUg'YfghY'CVYf[YgW cgg'XYg' < Ui gYgž'k Ug'X]Y'G]hi Uh]cb'_f]h]gW a UW hY"

$9]b[fY]ZYbXYfXYiYfkY\f$

8]Y: Yi Yfk Y\f'k Uf'gW\bY``ni f'GhY``Yž'a]h'fi bX'(\$'9]bgUhn_fÀZhYbž X]Y'i a [Y\YbX'A U» bU\a Yb'Yf[f]ZZYb"'GYW\g'Hfi ddg'hfUhYb'i bhYf 5hYa gW\i hn'Ubž'i a 'X]Y': `Ua a Yb'ni 'VY_Àa dZYb"'5i g[YghUhhYh a]h'nk Y]'GhfU\`fc\fYb'i bX'Y]bYa 'GW\Ui a fc\fž'gYhnhYb'g]Y'U``Yg XUfUbž'XUg': Yi Yf'Y]bni XÀa a Yb'i bX'[fÒ» YfYb'GW\UXYb'ni j Yf\]bXYfb"'=\fY'YZZY_h]j Y'5fVY]h'gcf[hY'XUZØfž'XUgg'_Y]bY A YbgW\Yb'j YfYhnh'k i fXYbž'i bX'X]Y'5i ZfÀi a UfVY]h'b'gW\bY``

 $8]Y : 5bk c b Y f'a i gghYb'k Å f Yb X : XY f'@OgW Uf VY]hYb'] f Y K c bi b [Yb'j Yf'UggYb z'_cbbhYb' YXcW 'b UW '5 VgW 'i gg' XY f 9]b g Uhna U b U a Yb'k]Y XY f']b'] f Y'F Å i a `]W _Y]hYb'ni f Ø W __Y f Yb'' 8]Y g' g c f [hY' ZØ f' 9 f' Y] W hY f i b [z' X U' Y g' _ Y]b' D Y f g c b Y b g W U X Yb'ni V Y _`U [Yb' [UV'' 8 Ug' f Ug W Y' < Ub X Y' b' X Y f': Yi Y f k Y \ f']g h' Y]b' [i h Y g 6 Y] g d] Y ``ZØ f' X] Y' D f c Z Y g g] c b U `]h Å h' i b X' g W b Y ``Y' F Y U _h] c b' X Y f F Y h h i b [g_f À Z h Y'] b' g c' W Y b' _f] h] g W Y b' G] h i Uh] c b Y b''$

6fUbXi fgUWXY'i bX'U_hi Y``Y'G]hi Uh]cb

8]Y'6Y\ÒfXYb'ghY\Yb'bcW\'jcf'XYf'<YfUigZcfXYfib[ž'X]Y'[YbUiYIfgUW\Y'XYg': YiYfg'ni 'Yfa]hhY`b"'8Yf'FUiaž']b'XYa 'XYf'6fUbXUigVfUW\ž'kUf'ZØf'X]Y'@U[Yfib['jcb'AØ``'jcf[YgY\Ybž'kUg:fU[Yb'nif'G]W\Yf\Y]h'ibX'CfXbib['k]fZh"'Jcf'5``Ya']bghÀXh]gW\Yb'; YV]YhYb'gd]Y`h'X]Y'f]W\h][Y'<UbX\UVib['jcb5VZÀ``Yb'Y]bY'kYgYbh`]W\Y'Fc``Yž'ia'gc`W\Y'JcfZÀ``Y'nijYfaY]XYb"'9]bY'[fØbX`]W\Y'IbhYfgiW\ib['k]fX'XU\Yf'bchkYbX][gY]bž'ia'À\b`]W\Y'JcfZÀ``Y']b'XYfNi_ibZh'nijYf\]bXYfb"

K]WX h][_Y]h'XYf'i a [Y\YbXYb BchZU``a U» bU\a Yb

♣ 'XYf'\Yi h][Yb'NY]hž']b'XYf'X]Y'G]W\Yf\Y]h'i bX'XYf'GW\i hn'j cb
A YbgW\Yb`YVYb'Ub'YfghYf'GhY``Y'ghY\Ybž'g]bX'X]Y'9]bgÀhnY'XYf
: Yi Yfk Y\f'j cb'\YfUi gfU[YbXYf'6YXYi hi b["'B]W\h'bi f'X]Y
dfcZYgg]cbU`]g]YfhY'5fVY]h'XYf': Yi Yfk Y\f`Yi hY']gh'\]Yf

Ui ggW\`U[[YVYbXž:gcbXYfb`Ui W\`XUg`U`YfhYg`<UbXY`b`XYf
5bk c\bYf'_Ubb`]b`_f]h]gW\Yb`A ca YbhYb`XYb`I bhYfgW\]YX
nk]gW\Yb`; YZU\f`i bX`G]W\Yf\Y]h`Ui ga UW\Yb"`9g`]gh`Y]b`ghUf_Yg
NY]W\Yb`XYf`; Ya Y]bgW\UZhž'k Ybb`BUW\VUfb`ni gUa a YbUfVY]hYbž
i a `g]W\`[Y[YbgY]h][`ni `gW\ØhnYb"`Gc`W\Y`JcfZ\``Y`j YfXYi h`]W\Ybž
XUgg`K UW\\gUa _Y]h`]b`XYf`BUW\VUfgW\UZh`i bX`Y]bY`[i h
Zi b_h]cb]YfYbXY`: Yi Yfk Y\f`<UbX`]b`<UbX`[Y\Ybži a `i bgYfY
Gh\XhY`g]W\YfYf`ni `[YghU`hYb"

: Yi Yfk Y\f'i bX'FYhhi b[gY]bgÀhnY']b 8fYgXYb

8]Y: Yi Yfk Y\f'gYhnh'Ui Z'fY[Y`a À»][Y', Vi b[Yb'i bX'GW\i`i b[Yb ZØf']\fY'9]bgUhn_fÀZhYži a ']b'j YfgW\]YXYbYb'BchZU``gnYbUf]Yb j cfVYfY]hYh'ni 'gY]b"'6Y]'X]YgYa '9]bgUhn'k Uf'XYf'[Yn]Y`hY'9]bgUhn j cb'5hYa gW\i hn'i bX'a cXYfbYb'@ÒgW\hYW\b]_Yb'YbhgW\Y]XYbXž i a 'XUg': Yi Yf'gW\bY``i bhYf'?cbhfc``Y'ni 'Vf]b[Yb'i bX'Y]bY 5i gVfY]hi b['Ui Z'k Y]hYfY'K c\bi b[Yb'i bX'; YgW\ÀZhY'ni j Yf\]bXYfb"

< Ài Z][Y 6fUbXi fgUWX Yb i bX DfÀj Ybh]cbga U» bU\a Yb

I a ZfU[Yb'nY][Ybž'XUgg'X]Y'\Ài Z][ghYb'6fUbXi fgUWXYb']b
K c\b[YV]YhYb'[Y`Y[Ybh`]WX'Ui Zii bgUWX[Ya À»Y'6Ybi hni b['j cb
Y`Y_hf]gWXYb'; YfÀhYbž'cZZYbYg'@]WXh'cXYf'i bgUWX[Ya À»Y
9bhgcf[i b['j cb'5VZÀ``Yb'ni fØW_ni ZØ\fYb'g]bX"'8]Y': Yi Yfk Y\f
fÀhž'fY[Y`a À»]['FUi WXa Y`XYf'ni ']bghU``]YfYb'i bX'Ui Z

=a '*J\f'&\$&&'j YfnY]W\bYhY'XYf'8Yi hgW\Y': Yi Yfk Y\fj YfVUbX
f8: J \(\frac{1}{2} \) b'8 Yi hgW\`UbX']bg[YgUa h'%) \$"\$\$\$'6f\(\hat{A} \hat{b} \text{XY}\) \(\frac{1}{2} \text{XY} \) \(\frac{1}{2} \text{Y} \

I a `X]Y`6fUbX[YZU\f`]b`ghÀXh]gWXYb`; YV]YhYb`ni `a]b]a]YfYbž'[]Vh Yg`nU\`fY]WXY`DfÀj Ybh]cbg_Ua dU[bYbž'X]Y`j cb`; Yi Yfk Y\f`i bX GhUXhj Yfk U`hi b[`i bhYfghØhnh`k YfXYb"`8]YgY`? Ua dU[bYb`n]Y`Yb XUfUi Z`UVž'XUg`6Yk i gghgY]b`ZØf`X]Y`K]WXh][_Y]h'j cb 6fUbXgWXi hna U»bU\a Yb`ni `gWXÀfZYb`i bX`\d\Zcfa Uh]cbYb`ni `XYb f]WXh][Yb`JYf\U`hYbgk Y]gYb`]b`BchZÀ``Yb`VYfY]hni ghY``Yb"

JYfUbhk cfhi b[XYf 5bk c\bYf

 $8]Y \cdot U_h]j Y \cdot 6Y hY]`][i b[`XYf \cdot 5bk c \bYf \cdot]gh \cdot YVYb ZU``g \cdot Yb hg W Y]XYb X ZØf \cdot XYb \cdot 9f Zc`[`j cb \cdot 6f Ub X V Y_A a d Z b[ga U \sigma b U \a Yb'' \sigma `U_h i Y``Yb : U```\UVYb \cdot g W \bY```f Y U[]Yf Y b X Y \cdot 5bk c \bYf \cdot X Y b \cdot 6f Ub X \cdot V Y a Yf_h i b X \cdot X]Y : Yi Yfk Y \f `U`Ufa]Yf hz k Ug a <math>O[`]W Yfk Y]g Y \cdot GW \cdot]a a Yf Yg j Yf \]b X Yfh \cdot Uh'' \cdot 8 Ug \cdot 9b[U[Ya Ybh \cdot X Yf ; Ya Y]b g W UZh \cdot Ub b \cdot b] W h [Ybi [`[Yk Øf X][h k Yf X Y b z \cdot X U Y g \cdot Zh ni Y]b Y a \cdot g W \cdot b Y``Yf Y b i b X Y Z Y_h]j Yf Yb \cdot 9]b g Uhn \cdot X Yf \cdot F Y hhi b [g_f \cdot A Zh Y \cdot Z W \f h'']$

8]Y'GhUXh'8fYgXYb'ZÒfXYfh'BUW\VUfgW\UZhg\]`ZYb'i bX
9b[U[Ya Ybh']b'XYf'; Ya Y]bgW\UZhz'i a 'X]Y'G]W\Yf\Y]h'ni 'Yf\Ò\Yb"
J YfUbghU`hi b[Yb'i bX'\delta Zcfa Uh]cbgUVYbXY'ni a 'H\Ya U
6fUbXgW\i hn'k YfXYb'fY[Y`a À»]['cf[Ub]g]Yfhz'i a 'X]Y'6Øf[Yf'ØVYf
F]q]_Yb'Ui Zni _`ÀfYb'i bX'q]Y'ni f'U_h]j Yb'A]hk]f_i b['ni 'Ub]a]YfYb"

GWXi hn'j cb'\]ghcf]gWXYb'; YVÀi XYb']b'XYf BYi ghUXh

 $8 fYgXYb^* \setminus Uh^*Y]bY^*fY]WXY^*; YgWX]WXhY^*i bX^*j]Y^*Y^* \setminus]ghcf]gWXY ; YVAi XYž^*]bgVYgcbXYfY^*]b^*XYf^*BYi ghUXh^**8]Y^*9f \setminus U^*hi b[^*X]YgYf$

6Ui k Yf_Y`]gh'j cb`[fc» Yf'6YXYi hi b[ž'gck c\``Ui g
_i `hi f\]ghcf]gW\Yf'G]W\h'U`g'Ui W\ZØf'XYb'GhUXhV]`X"'=a :: U``Y'Y]bYg
6fUbXYg'k YfXYb'gdYn]Y``Y'@ÒgW\hYW\b]_Yb'i bX'!ghfUhY[]Yb
Ybhk]W_Y`hži a 'X]YgYb'; YVÀi XYb'XYb'[fÒ» ha Ò[`]W\Yb'GW\i hn'ni
V]YhYb'i bX'GW\ÀXYb'ni 'a]b]a]YfYb"

Ni gÀhn`]W\ k]fX`Ui Z`X]Y`9]b\U`hi b[`ghfYb[YfG]W\Yf\Y]hgj cfgW\f]ZhYb`[YUW\hYhž'i a `X]Y`F]g]_Yb`ZØf`U`hY`i bX gW\ØhnYbgk YfhY`; YVÀi XY`ni `j Yff]b[Yfb"`8]Y`GhUXhj Yfk U`hi b[UfVY]hYh`Yb[`a]h`XYf`: Yi Yfk Y\f`i bX`UbXYfYb`\Dgh]hi h]cbYb ni gUa a Ybž`i a `6fUbXgW\i hn_cbnYdhY`ni `Ybhk]W_Y`bž`X]Y`Ui Z`X]Y VYgcbXYfYb`6YXØfZb]ggY`XYf`\]ghcf]gW\Yb`6Ui gi VghUbn 5bdUggi b[`Z]bXYb"

8 Y hU]`q

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. 'X]Y!bUWX f]WX hYb "b Yh