

A c hc ffUXZU\ fYf`VY]`Ni gUa a Ybghc» `Ui Z  
9]g]b[ \Ui gYbYf`GhfU» Y`gWk Yf`j Yf`Yhnh

6Y]`Y]bYa `l bZU``]b`@Yf`\_c``X]YfhY`Y]b`A c hc ffUXZU\ fYf`a ]h  
Y]bYa `D\_k ž`Yf`]hh`gWk YfY`J Yf`Yhni b[ Yb`i bX`k i fXY`]bg  
?fUb\_Yb\Ui g`[ YVfUW`h"

5a `&+"5i [ i gh&\$&( `YfY][ bYhY`g]W`Ui ZXf`9]g]b[ \Ui gYbYf  
GhfU» Y`]b`@Yf`Y]b`gWk YfYf`J Yf`\_Y\fgi bZU``ž`XYf`Y]bYb  
A c hc ffUXZU\ fYf`]b`Yfbgh\UZhY`GWk ]Yf][ \_Y]hYb`VfUW`hY" `8Yf  
JcfZU``ZUbX`i a`%%.&) `l \f`ghUhz`U`g`XYf`\* +!`Å\`f][ Y  
A c hc ffUXZU\ fYf`Ui g`@Yf`]b`F ]W`hi b[ `@c[ UV]fi a`i bhYfk Y[ g`k Uf"

8Yf`l b[ `ØW\_g\Yf[ Ub[ `VY[ Ubbž`U`g`Y]b`, (!`Å\`f][ Yf`5i hcZU\ fYf`Ui g  
A ccfa Yf`UbX`c`ZYbVUf`i bUW`hgUa`j ca`A YhhYk Y[ `bUW``]b\_g  
UVVc[ ``8UVY]`ØVYfgU\`Yf`XYb`A c hc ffUXZU\ fYf`ž`k Ug`]b`Y]bYf  
\Yzh[ Yb`?`c``]g]cb`nk ]gW`Yb`XYb`VY]XYb`i: U\fnYi [ Yb`YbXYhY"  
K`Å\`fYbX`XYf`5i hcZU\ fYf`i bj Yf`Yhnh`V`]YVž`nc[ `g]W`XYf  
A c hc ffUXZU\ fYf`gWk YfY`J Yf`Yhni b[ Yb`ni ž`X]Y`gcZcfh][ Y  
a YX]n]b]gW`Y`J Yfgcf[ i b[ `YfZcfXYfhY"

8YhU]`g`ni a`l bZU``j Yf`Ui Z

B UW`XYa`Ni gUa a Ybghc» `k i fXY`XYf`\* +!`Å\`f][ Y`i a [ Y\YbX  
Yfghj Yfgcf[ hi bX`]b`Y]b`?fUb\_Yb\Ui g`[ YVfUW`hž`k c`Yf`VY\UbXY`h  
k YfXYb`a`i gghY" `8Ug`A c hc ffUX`XYg`J Yfi bZU``hYb`k Uf`b]W`h`a`Y\`f  
ZU\ fVYfY]hi bX`a`i gghY`UbgW`]Y» YbX`UV[ YgW`Yddh`k YfXYb" `8Yf  
D\_k`XYg`, (!`Å\`f][ Yb`\]b[ Y[ Yb`V`]YV`ZU\ fZÅ\][ ž`Yg`YbhghUbX  
`YXcW`Yf\YV`]W`Yf`GUW`gW`UXYb"

8]Y`Dc`nY]`k Uf`gW`bY``j cf`C`fhi bX`gdYffhY`XYb`l bZU``VYfY]W`j`cb  
%%.`\$`l \f`V]g`%&.\$\$.`l \f`ž`i a`X]Y`9fa ]hhi b[ Yb`Ui Zni bY`a`Yb" `8]Y

[ fØbX`j]Wk Yb`i bhYfgi Wk i b[ Yb`n]Y`Yb`XUfUi ZUVžXYb`[ YbUi Yb  
<Yf[ Ub[ `XYg`J cfZU`g`ni ` \_`ÀfYb" `8]YgY`fYWk h]Wk Yb`GWk f]hhY`g]bX  
k ]Wk h][ ži a`a Ø[ `]Wk Y`i fgUWk Yb`i bX`J YfUbhk cfh]Wk \_Y]hYb  
ZYghni ghY`Yb"

## 6YXYi hi b[ `XYg`J cfZU`g

I bZÀ`Y`k ]Y`X]YgYf`k YfZYb`Y]b`GWk`U[ `]Wk h`Ui ZX]Y` ; YZU\ fYb`]a  
GhfU» Ybj Yf\_Y\ fž`VYgcbXYfg]b`6YfY]Wk Yb`a ]h`c\Ya  
J Yf\_Y\ fgUi Z\_ca a Yb" `8]Y`i bhYfgWk ]YX`]Wk Y`K U\fbY\ a i b[ `j cb  
J Yf\_Y\ fghY`]bY\ a Yfb`\_Ubb`ni `hfU[ ]gWk Yb`? cbgYei YbnYb`ZØ\ fYb"  
8Yf`J cfZU` ]gh`Y]b`YfbØWk hfYbXYg`6Y]gd]Y`XUZØfž`k ]Y`gWk bY`  
gWk Yfk ]Y[ YbXY`i bZÀ`Y`[ YgWk Y\ Yb`\_ØbbYb`i bX`gc`hY`U`Yb  
J Yf\_Y\ fghY`]bY\ a Yfb`U`g`A U\bi b[ `X]YbYbž`g]Wk`ghYhg  
Ui Za Yf\_gUa`i bX`fØW\_g]Wk hgj c`ni`j Yf\U`hYb"

9g`]gh`k ]Wk h][ ž`XUgg`À`hYfY`5i hcZU\ fYf`VYgcbXYfg`j cf]g]Wk h][ `g]bX  
i bX`X]Y`VYgcbXYfg`Yf\Ø\hY`J YfUbhk cfhi b[ `ZØf`X]Y`G]Wk Yf\Y]h  
U`Yf`J Yf\_Y\ fg!VYhY`][ Yb`]a`6`]W\_` \UVYb" `8Yf`i bZU` \_ØbbhY`Ui Wk  
8]g\_i gg]cbYb`XUfØVYf`Ui g`ØgYbž`k ]Y` : U\fUbZÀb[ Yf`i bX`YfZU\ fYbY  
: U\ fYf`VYggYf`[ YgWk i`h`k YfXYb`\_ØbbYbž`i a`gc`Wk Y`gWk YfYb  
J cfZÀ`Y`ni`j Yf\]bXYfb"

8]Y`HUhgUWk Yž`XUgg`XYf`A chcffUXZU\ fYf`gWk YfY`J Yf`Yhni b[ Yb  
Yf`]hhYb` \Uhž`k ]fX`a Ø[ `]Wk Yfk Y]gY`Ui Wk`X]Y`G]Wk Yf\Y]hgX]g\_i gg]cb  
i bhYf`A chcffUXZU\ fYfb`Ub\Y]nYb" `GWk i hn`Y]Xi b[ `i bX  
G]Wk Yf\Y]hgj cf\_Y\ fi b[ Yb`gc`hYb`ghYh][ `]a` : c\_i g`ghY\Ybž`i a`XUg  
F]g]\_c`VY`i bZÀ`Yb`ni`a`]b]a` ]YfYb" `5i g`XYb`i bhYfgWk ]YX`]Wk Yb  
FYU\_h]cbYb`XYf`6YhY`][ hYb`i bX`XYb`Yk Y`][ Yb`6YX]b[ i b[ Yb`XYg  
I bZU`cfhYg`\_ØbbYb`k Yfhj c`Y`@Y\ fYb`[ Ync[ Yb`k YfXYbž`X]Y`ni f  
J YfVYggYfi b[ `XYf`J Yf\_Y\ fgg]Wk Yf\Y]h`VY]hfU[ Yb`\_ØbbYb"

⊕ 5bVYhfUWk h`XYf`[ Y[ Ybk`Àfh][ Yb`G]hi Uh]cb`]gh`Yg`Yb hgWk Y]XYbXž  
XUgg`U`Y`J Yf\_Y\ fghY`]bY\ a Yf`gYbg]VY`i a [ Y\Yb`a ]h`XYa`H\Ya U  
G]Wk Yf\Y]h]a`GhfU» Ybj Yf\_Y\ f" »XYf`gc`hY`g]Wk`XUfØVYf`]a`?`UfYb  
gY]bž`k ]Y`k ]Wk h][ `Yg`]ghž`Ui Za Yf\_gUa`ni`gY]b`i bX`Ui ZX]Y`UbXYfYb  
J Yf\_Y\ fghY`]bY\ a Yf`FØW\_g]Wk h`ni`bY\ a Yb"

# 9]bV`]W\_Y`]b`J Yf\_Y\ fgg]W\ Yf\ Y]h

J YfUbghU`hi b[ Yb`cXYf`5i Z\_`Äfi b[ g\_Ua`dU[ bYb`ni f  
J Yf\_Y\ fgg]W\ Yf\ Y]h`\_ÖbbhYb`g]W\`U`g`bØhn`]W\`Yfk`Y]gYbž`i`a`XUg  
6Yk`i`gghgY]b`ni`gW\ÄfZYb`i`bX`XUg`i`bZU`f]g]\_c`ni`gYb`\_Yb`"; YfUXY  
VY]`j`Yf\_Y\ fgy]W\ Yb`NcbYb`gc`h`X]Y`5i`Za`Yf\_gUa`\_Y]h`U`Yf  
J Yf\_Y\ fghY]`bY\`a`Yf`Yf\`Ö\`h`k`YfXYbž`i`a`Ä`b`]W\`Y`J`cfZÄ`Y`]b`XYf  
Ni`\_i`bZ`ni`j`Yfa`Y]XYb`"9g`V`Y]Vh`ni`\_c`ZYbž`XUgg`XYf`j`Yf`Y`h`h`Y  
A`c`h`c`f`f`U`X`Z`U`\`f`Y`f`g`W\`b`Y`" [ YbYgYb`\_Ubb`i`bX`XUgg`gc`W\`Y`J`cfZÄ`Y`  
\_ØbZ] [ j`Yfa`Y]XYb`k`YfXYb`\_ÖbbYb"

# I`bZU`ghUh]gh]\_Yb`]a`GhfU»Ybj`Yf\_Y\`f

⇒`\_X\`f`&`\$`&`k`i`fXYb`]b`8Yi`hgW\`UbX`Ui`h`XYa`GhUh]gh]gW\`Yb  
6i`bXYgUa`h`ØVYf`&ž)`A`J`]cbYb`J`Yf\_Y\`f`gi`bZÄ`Y`f`Y`[`]ghf]Yfh`"8`Uj`cb  
ZØ\`fhYb`Y`hk`U`"\$`\$`\$`\$`ni`DYfgcbYbgW\`ÄXYbž`k`cVY]`a`Y\`f`U`g  
`"\$`\$`\$`A`YbgW\`Yb`]f`@YVYb`j`Yf`c`f`Yb`"6YgcbXYfg`Ui`ZÄ`][`]ghž`XUgg  
A`c`h`c`f`f`U`X`Z`U`\`f`Y`f`]a`J`Yf`[`Y]W\`ni`UbXYfYb`J`Yf\_Y\`f`ghY]`bY\`a`Yfb  
Y]b`\`Ö\`YfYg`F]g]\_c`hfU[ Yb`"K`Ä\`fYbX`A`c`h`c`f`f`Ä`X`Y`f`ZØf`bi`f`Y`hk`U`&i  
XYg`[`YgUa`h`Yb`GhfU»Ybj`Yf\_Y\`f`g`ghY\`Ybž`g]bX`g]Y`Ub`ØVYf`%)`i`XYf  
h`ÖX`]W\`Yb`J`Yf\_Y\`f`gi`bZÄ`Y`VYhY]`][`h`Gc`W\`Y`NU\`Yb`j`YfXYi`h]W\`Yb  
X]Y`;`YZU\`fYbž`X]Y`a`h`XYa`i`U\`fYb`j`cb`A`c`h`c`f`f`Ä`X`Y`fb`j`YfVi`bXYb  
g]bX`i`bX`i`bhYfghfY]W\`Yb`X]Y`B`chk`YbX][`\_Y]hj`cb  
g]W\`Yf\`Y]hgghY][`YfbXYb`A`U»`bU\`a`Yb"

# ;`YgYhn`]W\`Y`F`U\`a`YbVYX]b`[`i`b`[`Yb`i`b`X

# G]W\`Yf\`Y]hga`U»`bU\`a`Yb

⇒`8Yi`hgW\`UbX`[`]Vh`Yg`a`Y\`f`Y`f`Y`[`YgYhn`]W\`Y`F`Y`[`Y`i`b`[`Ybž`X]Y  
XUfUi`Z`UVn]Y`Ybž`X]Y`J`Yf\_Y\`f`gg]W\`Yf\`Y]h`ni`Yf\`Ö\`Yb`"8`Uni  
[`Y\`ÖfYb`i`bhYf`UbXYfYa`X]Y`DZ]W\`h`ni`a`HfU[ Yb`j`cb`<`Y`a`Yb`ZØf  
A`c`h`c`f`f`U`X`Z`U`\`f`Y`f`i`bX`X]Y`j`cf`[`YgW\`f]YVYbY`G]W\`Yfi`b`[`j`cb`?]bXYfb  
]a`5i`hc`"Ni`XYa`i`[`]Vh`Yg`f`Y`[`Y`a`Ä»][`Y  
J`Yf\_Y\`f`gg]W\`Yf\`Y]hg\_Ua`dU[ bYbž`X]Y`j`cb`j`YfgW\]YXYbYb  
C`f`[`Ub]gUh]cbYbž`Y]bgW\`Y»`]W\`XYf`Dc`]nY]ž`Xi`fW\`[`YZØ\`fh`k`YfXYbž  
i`a`XUg`6Yk`i`gghgY]b`ZØf`g]W\`YfYg`i`U\`fYb`ni`gW\`ÄfZYb`"9g`[`]Vh  
Dfc`[`fUa`a`Yž`X]Y`g]W\`gdYn]Y`"Ub`Ä`h`Y`f`Y`5i`hc`ZU\`f`Y`f`f]W\`hYbž`i`a`

XYfYb': U\ fj Yf\ U'hYb'i bX'G]W\Yf\Y]h]a 'GhfU» Ybj Yf\_Y\ f'ni  
ZòfXYfb"

F c`Y`XYf`J Yf\_Y\fgYfn]Y\i b[

J Yf\_Y\fgYfn]Y\i b[ 'gd]Y'h'Y]bY`YbhgW\Y]XYbXY`F c`Y`VY]`XYf  
J Yff]b[ Yfi b[ 'j cb`J Yf\_Y\fgi bZ`Yb"GW\i`Yb'i bX`bgh]hi h]cbYb  
V]YhYb`Dfc[ fUa a Y`Ubž`X]Y`b]W\h'bi f'?]bXYfbž`gcbXYfb`Ui W\  
À`hYfYb': U\ fYfb`Y`ZYb`gc`Ybž`\fY': U\ f\_Ybbhb]ggY`ni`j YfVYggYfb"  
8i fW`G]a i`Uhc fYb'i bX`DfUI ]g\_i fgY`k ]fX`j Yfgi W\hž`dchYbn]Y`Y  
; YZU\ fYb`]a`GhfU» Ybj Yf\_Y\ f`VYggYf'ni`j YfghY\Yb'i bX`ni  
j Yfa Y]XYb": cfgW\i b[ Yb`nY][ Ybž`XUgg`Y]bY`ZfØ\ nY]h[ Y  
5i Z\_`Àfi b[ 'ØVYf`J Yf\_Y\fgg]W\Yf\Y]h`Ub[ Zf]gh][`ni`Y]bYa  
j YfUbhk cfhi b[ gj c`YfYb`J Yf\ U'hYb`]a`GhfU» Ybj Yf\_Y\ f`ZØ\ fhi bX  
gca ]h'i bZ`Y`fYXi n]YfYb`\_Ubb"

8Yf`l bZU`Ui Z`XYf`9]g]b[ \Ui gYbYf`GhfU» Y`]ghY]b`hfU[ ]gW\Yg  
6Y]gd]Y`XUZØfž`k ]Y`k ]W\h][`gc`W\Y`dfÀj Ybh]j Yb`A U» bU\ a Yb`g]bXž  
i a`X]Y`G]W\Yf\Y]h`U`Yf`J Yf\_Y\ fghY]`bY\ a Yf'ni`[ Yk À\ f`Y]ghYb"

8YhU]`g

6Ygi W\Yb`G]Y`i bg`Ui Z.`b!U[ "XY