

: U\ ffUXZU\ fYf'i bhYf'5`\_c\c`i bX'8fc[ Yb.  
K ]XYfghUbX'[ Y[ Yb'X]Y'Dc`]nY]']b'; Ui !  
CXYfb\Y]a

: U\ ffUXZU\ fYf'i bhYf'5`\_c\c`!i bX'8fc[ YbY]bZi gg`Y]ghYh  
K ]XYfghUbX'VY]'?cbhfc`Y`Y]b'6YUa hYf'j Yf`Yhnh"

*5`nYm'fcbgk*

⊖Y]bYf'bÅW h]WYb'5\_h]cb']b'; Ui !CXYfb\Y]a '[ Yf]YhYb  
Dc`]nY]VYUa hY`b'Y]bY'\Y]\_`Y`G]hi Uh]cbžX]Y`]a a Yf'\Åi Z][ Yf']b'XYb  
: c\_i g'XYf'² ZZYbh]W\_X]h'fØW\_h"⊖XYf'ZfØ\Yb'Ghi bXY'XYg  
GcbbhU[ gžXYa`&)"5i [ i gh&\$&( žZ]Y`Y]bYa`GhfY]ZYbk U[ Yb'Y]b  
: U\ ffUXZU\ fYf'Ui Z'XYf'a ]h'Y]bYa`i bg]WYfYb': U\ fgh]`i bX'ghUf\_  
j Yff]b[ YfhYf'G]W hVUf\_Y]hXi fW`X]Y`GhfU»Yb`Wfi ]ghY"GY]b`FUX`k Uf  
b]W h'VY`Yi W hYhž'i bX`X]Y'5fhž'k ]Y`Yf`Z` \fž`Y»`Ui Z  
U`\_c\c`VYX]b[ hY'6YY]bhfÅW h][ i b[ `gW`Y]»Yb"

8Yf'A Ubbž&,`ϰ\ fY`U`hž'a UW hY`XUg'5b\U`hYb'ZØf`X]Y'Dc`]nY]  
ni bÅW gh'gW k ]Yf][ žXU`Yf'b]W h'Ui Z`X]Y'5i Zc fXYfi b[ Yb  
fYU[ ]YfhY"9fgh'Ub`XYf'9]ba ØbXi b[ `ni f'DYghU`cnn]ghfU»Y`k Uf`Yf  
VYfY]h'Ubni \U`hYb"8]Y'?cbhfc`Y`cZybVUfhY`gW`bY`X]Y`l fgUW`Y  
ZØf`gY]bY': U\ fk Y]gY"9]b`ZfY]k ]`][ Yf'5hYa U`\_c\c`hYghYf[ UV`Y]bYb  
U`Ufa ]YfYbXYb`K Yfh]j cb`%ž ,`Dfca ]`Yž`k Ug`Y]bY`Yf\YV`]W`Y  
; YZÅ\ fXi b[ `]a`GhfU»Ybj Yf\_Y`f`XUfghY`h"Ni XYa`k ]Yg`XYf`HYgh  
Ui Z?cbgi a`j cb`?c\_U]b`\]bž`k Ug`X]Y`G]hi Uh]cb`k Y]hYf  
j Yf\_ca`d`]n]YfhY"

K ]XYfghUbX'[ Y[ Yb'X]Y'Dc`]nY]

K Å\ fYbX`XYf'bchk YbX][ Yb`A U»bU`a Yb`ni f`G]W YfghY`i b[ `XYf  
J Yf\_Y`f`gg]W Yf\Y]h' bX`XYf'; Ygi bX\Y]h`XYg': U\ fYfg`nY][ hY`g]W

X]YgYf'ni bY\ a YbX'i b\_ccdYfUhj "9]b'K ]XYfghUbX'k Uf'X]Y': c`[ Yž U'g'X]Y'6YUa hYb'j\ a 'Y]bY'6'i hdfcVY'YbhbY\ a Yb'k c`hYb"8Yf A Ubb'gYhnhY'g]W\ a ]h'gY]bYb'5fa Yb'ni f'K Y\ fž'k Ug'X]Y'Dc`]nY] nk Ub[ ž'a Y\ fYfY'6YUa hY'ni 'a cV']g]YfYbž'i a 'XYb'K ]XYfghUbX'ni VfYW\ Yb" Gc`W\ Y'J cfZÄ`Y'j YfXYi h]W\ Yb'X]Y'<YfUi gZcfXYfi b[ Ybž a ]h'XYbYb'X]Y'Dc`]nY] hU[ hÄ [ `]W\ \_cbZfcbh]Yfh']gh' `cZh'a ØggYb'g]Y ]b'gW\ k ]Yf][ Yb'G]hi Uh]cbYb'XYg\_U`]YfYbž'X]Y'b]W\ h'gY'hYb'Ui W\ ; Yk U'h'a ]h'g]W\ Vf]b[ Yb"

6Y]'X]YgYa '9]bgUhn'k i fXY'Y]b') - !Ä\ f][ Yf'Dc`]nY]VYUa hYf j Yf'Yhnhž'U'g'Yf'g]W\ VY]XYf'?cbhfc`Y'Y]bY'GW\ ØfZk i bXY'Ua fYW\ hYb'i bhYfUfa 'ni nc[ " ; `ØW\_`]W\ Yfk Y]gY'\_cbbhY'Yf'gY]bYb 8]Ybgh'YXcW\ ZcfhgYhnYbž'k Ug'Y]b'k ]W\ h][ Yf': U\_hcf']ghž'XU J Yf'Yhni b[ Yb']b'gc`W\ Yb'G]hi Uh]cbYb'Ui g[ Y\_'Ua a Yfh'k YfXYb a ØggYbž'i a 'X]Y'G]W\ Yf\Y]h'U`Yf'6YhY']][ hYb'ni '[ Yk Ä\ f'Y]ghYb"

## 8 ]Y'G]hi Uh]cb'ja 'J Yf\_Y\ fgVYfY]W\

8Yf'J cfZU`k ]fZh'Y]b'GW\ U[ `]W\ h'Ui Z'X]Y'Ub\ U'hYbXY'DfcV`Ya Uh]\_ XYg'U'\_c\c`g]YfhYb'i bX'Xfc[ YbVYY]bZi gghYb': U\ fYbg" ð'Y]bYf NY]hž']b'XYf'X]Y'; YZU\ fYb'X]YgYf'5fh'XYg': U\ fYbg'i a ZUggYbX VY\_Ubbh'g]bXž']gh'Yg'VYi bfi \][ YbX'ni 'gY\Ybž'XUgg'Yg]a a Yf'bcW\ DYfgcbYb '[ ]Vhž'X]Y'X]Yg][ bcf]YfYb"8]Y'Dc`]nY]'`Uh]b'gc`W\ Yb : Ä`Yb'X]Y'5i Z[ UVYž'b]W\ h'bi f'X]Y'G]W\ Yf\Y]h]a 'GhfU» Ybj Yf\_Y\ f ni '[ Yk Ä\ f'Y]ghYbž'gcbXYfb'Ui W\ ž'dchYbn]Y`Y'HÄhYf'j cb nU\ fY]W\ Yb'i bhYf'l a ghÄbXYb'Ui W\ i bgW\ i `X][ Yb J Yf\_Y\ fghY]'bY\ a Yfb'UVni gW\ ]fa Yb"

ð'5`nYmi bX'XYb'i a `]Y[ YbXYb'; Ya Y]bXYb'k ]fX'gc`W\ Yb J cfZÄ`Yb'ghUf'\_bUW\ [ Y[ Ub[ Ybž'i a 'X]Y'ÖZYbh]W\ Y'G]W\ Yf\Y]h Ui ZfYW\ hni Yf\ U'hYb"8]Y'VYhfcZZYbYb'Dc`]nY]VYUa hYb'a ØggYb'g]W\ cZh'b]W\ h'bi f'a ]h'XYb'i ba ]hY`VUfYb'<YfUi gZcfXYfi b[ Yb'XYf ?cbhfc`Y'j cb': U\ fYfb'Ui gY]bUbXYf'gYhnYbž'gcbXYfb'Ui W\ a ]h'XYb a YbhU'Yb'i bX'd\mg]gW\ Yb'B UW\ k ]f\_i b[ Yb'Y]bYf'gc`W\ Yb 6Y[ Y[ bi b[ "

9]b'YbhgW\ Y]XYbXYf'5gdY\_h]b'X]YgYa 'Ni gUa a Yb\Ub[ `]gh'X]Y Bchk YbX][ \_Y]hž'gc`W\ Y'J cfZÄ`Y'ni 'Xc\_i a Ybh]YfYb'i bX

Ui gni k YfhYb"8 ]Y'8 UhYb'i bX'9fZU\ fi b[ Yb'Ui g'X]YgYb'9]bgÀhnYb  
g]bX'k ]W\h[ ži a 'GW i 'i b[ Yb'Ubni dUggYb'i bX'X]Y  
9]bgUhnghfUHY [ ]Yb'XYf'Dc`nY]`\_cbh]bi ]Yf`W\ ni 'j YfVYggYfb"

; YgY`gW\ UZh`W\ Y`< YfUi gZcfXYfi b[ Yb

⊕`XYf`YhnhYb`NY]h]gh`Yg`ni `Y]bYa `5bgh]Y[ 'j cb`JcfZÀ`Yb`k ]Y  
X]YgYa ` [ Y`\_ca a Ybž`k Ug`X]Y`Xf]b[ YbXY`Bchk YbX][ \_Y]h`XYf  
5i Z`Àfi b[ `ØVYf`X]Y`F]g]\_Yb`j cb`5`\_c`c`!`i bX`8fc[ Yb`\_cbgi a `]a  
GhfU» Ybj Yf`Y`f`i bhYfghfY]W\h`9g]gh`YggYbn]Y`ž`XUgg`X]Y  
; Ya Y]bgW\ UZh`k Y]hYf\]b`gYbg]V`]g]Yfh`k ]fXž`i a `gc`W\Y  
[ YZÀ`f`]W\Yb`J Yf`U`hYbgk Y]gYb`ni `a ]b]a ]YfYb`i bX`Yhnh`]W\`ni  
j Yf`]bXYfb"

8]Yg`]gh`VYgcbXYfg`k ]W\h[ `]b`<]bV`]W`Ui Z`X]Y`C dZYfgW\ i hn[ YgYhnY  
i bX`X]Y`J YfUbhk cfhi b[ ž`X]Y`YXYf`9]bnY`bY`]a `GhfU» Ybj Yf`Y`f`  
ØVYfbca a Yb`gc`hY`Gc`Ub[ Y`X]YgY`< YfUi gZcfXYfi b[ Yb  
VYghY`Ybž`k ]fX`X]Y`5i Z[ UVY`XYf`Dc`nY]`\_ca d`YI `V`Y]VYbž`i bX`X]Y  
DfĀj Ybh]cb`a i gg`k Y]hYf\]b`Y]b`nYbhfU`Yg`9`Ya Ybh`]b`XYf  
ni \_ØbZh][ Yb`GhfUHY [ ]Y`gY]bž`i a `gck c`X]Y`6YUa hYb`U`g`Ui W\`X]Y  
6Øf[ Yf`ni `gW\ØhnYb"

I fgUW\ Yb`ZØf`GhfU» Ybj Yf`Y`f`fgXY`]\_hY

8]Y`<Āi Z] b[ 'j cb`J Yf`Y`f`fgi bZÀ`Yb`]a `Ni gUa a Yb`Ub[ `a ]h  
5`\_c`c`!`i bX`8fc[ Yba ]ggVfUi W\`k ]fZh`Xf]b[ YbXY`fU[ Yb`Ui Z`⊕  
8Yi hgW\`UbX`]gh`U`fYb`i bhYf`XYa `9]bZi gg`j cb`5`\_c`c`!`i bX  
8fc[ Yb`Y]bY`XYf`Āi Z][ ghYb`I fgUW\Yb`ZØf`gW\k YfY  
J Yf`Y`f`fgi bZÀ`Y`@Ui h`Y]bYf`GhU]gh]\_`XYg`8Yi hgW\Yb  
J Yf`Y`f`fgg]W\Yf\Y]hgfUHYg`fB J F ěg]bX`U`\_c`c`VYX]b[ hY  
J Yf`Y`f`fgi bZÀ`Y`j cf`U`Ya `]b`XYb`ZfØ`Yb`A cf[ Ybghi bXYb`Āi Z][ ž  
k Ybb`j ]Y`Y`A YbgW\Yb`Ui g`DUfhmg`cXYf`Y]Yfb`bUW\`<Ui gY`ZU`fYb`  
Gc`W\Y`8Y`]\_hY`UVYb`b]W\h`bi f`ZUhU`Y`c`[ Yb`ZØf`XYb`6Yhfc`ZYbYb  
gY`Vghž`gcbXYfb`Ui W\`ZØf`i bgW\i`X][ Y`J Yf`Y`f`fghY`]bY`a Yf"

⊕`XYf`U`\_hi Y`Yb`G]hi Uh]cb`a ]h`XYa `&, !`Ā`f][ Yb`i: U`ffUXZU`fYfž  
XYf`a ]h`%ž , `Dfca ]`Y`i bX`dcg]h]j Ya `?c`\_U]bhYgh`Yfk ]gW\h`k i fXYž  
k ]fX`XYi h`]W\ž`k ]Y`Yfbgh`X]Y`@U[ Y`]gh`@Ui h`Y]bYf`J Yf`ØZYb`h`]W\i b[

XYf'6i bXYgnYbhfU'Y'ZØf'[ Ygi bX\Y]h'WXY'5i Z\_Àfi b[ 'fbN[ 5Ł'g]bX  
8fc[ Yb\_cbgi a 'i bX'5'\_c\c'a ]ggVfUi W\k Y]hj YfVfY]hYhY  
DfcV'Ya Yž'X]Y'cZh]b'Y]bYa 'HYi ZY'g\_fY]g'YbXYb" 'J ]Y'Y'6YhfcZZYbY  
g]bX'g]W\XYf'; YZU\f'b]W\h'VYk i ggh'cXYf' ][ bcf]YfYb'X]YgY'j Ò`][ "

## F YU\_h]cbYb'Ui Z'X]Y'J cfZÀ`Y'i bX DfÀj Ybh]cbga U» bU\ a Yb

BUW'J cfZÀ`Yb'k ]Y'XYa ' ]b'; Ui !CXYfb\Y]a 'k ]fX'\Ài Z][ 'ØVYf  
a Ò[ ' ]WY'DfÀj Ybh]cbga U» bU\ a Yb'X]g\_i h]Yfh" '8 ]Y'Dc` ]nY] 'i bX  
Òfh]WY'6Y\ØfXYb'gYhnYb'Ui Z'5i Z\_Àfi b[ g\_Ua dU[ bYbž'i a 'XUg  
6Yk i gghgY]b'ZØf'X]Y'; YZU\fYb'XYg': U\fYbg'i bhYf'9]bZi gg'j cb  
5'\_c\c' 'i bX'8fc[ Yb'ni 'gW\ÀfZYb" 'Dfc[ fUa a Y'ni f': ÒfXYfi b[ 'j cb  
U'hYfbUh]j Yb': cfhVYk Y[ i b[ ga Yh\cXYbž'k ]Y'ni a '6Y]gd]Y`': U\fYb  
a ]h'ÒZZYbh]WYb'J Yf\_Y\fga ]hY'b'cXYf': U\f[ Ya Y]bgWUZhYbž  
k YfXYb'YVYbZU`g ]bhYbg]j ]Yfh"

⇒ a ' :U\ f' & \$ & & 'k i fXYb' ]b'8Yi hgW\UbX'Vi bXYgk Y]h'a Y\ fYfY  
5\_h]cbYb'Xi fW [ YZØ\fhž'i a 'XUg'6Yk i gghgY]b'ZØf'g]WYfYg': U\fYb  
ni 'ZØfXYfb" '8 ]YgY'A U» bU\ a Yb'gc`Yb'b]W\h'bi f'XUni 'ZØ\fYbž'XUgg  
k Yb][ Yf'A YbgWYb'VYhfi b\_Yb'cXYf'i bhYf'8fc[ Yb'ZU\fYbž  
gcbXYfb'Ui W'XUni ž'XUgg'X]Y'6Yj Ò`\_Yfi b[ 'gYbg]V] ]g]Yfh'k ]fXž  
< ]ZY' ]b': cfa 'j cb': U\fX]YbghYb'cXYf'XYf'Gi WY'bUW'U'hYfbUh]j Yb  
HfUbgdcfha Ò[ ' ]W\_Y]hYb' ]b'5bgdfi W'ni 'bY\ a Yb"

## F YW hg`U[ Y'i bX' ? cbgYe i YbnYb'ZØf'8Y` ]\_hY ]a 'GhfU» Ybj Yf\_Y\ f

8 ]Y'F YW hg`U[ Y' ]b'8Yi hgW\UbX' ]gh' ]b'6Yni [ 'Ui Z'5'\_c\c' ! 'i bX  
8fc[ Yb\_cbgi a ' ]a 'GhfU» Ybj Yf\_Y\ f'\_Uf' [ YfY[ Y'h"': U\fYb'a ]h  
Y]bYa '6'i hU'\_c\c'k Yfhj cb'\$ž) 'Dfca ]`Y'cXYf'\ Ò\Yf'\_Ubb'a ]h  
Y]bYa '6i » [ Y'Xž'Di b\_hYb' ]b': `YbgVi f[ 'i bX'Y]bYa ' : U\fj YfVch  
[ YU\ bXYh'k YfXYb" '6Y]Y]bYa 'K Yfhj cb'%ž%Dfca ]`Y'cXYf'a Y\ f  
k ]fX'XYf'Ni ghUbX'U'g'UVgc'i h'ZU\fi bhUi [ ' ]W'Ub[ YgY\Ybž'k Ug'ni  
ghfUZfYW'h]WYb' ? cbgYe i YbnYb'ZØ\fYb'\_Ubb"

⇒ a ' : U`Y'XYg': U\ffUXZU\ fYfgž'XYf'a ]h'ž , 'Dfca ]`Y'Ub[ Y\U'hYb

k i fXYž\_ÖbbhY ]\a 'bYVYb'Y]bYa '6i » [ Y`X`Ui W`XYf'9bhni [ `XYf  
: U\fyf`Ui Vb]g`Xfc\Yb"8]Y'[ YbUi Yb'A U» bU\ a Yb`\Àb[ Yb  
U`YfX]b[ g]j cb`XYf`GWk YfY`XYg`J Yf[ Y\Ybg`i bX'a Ò[ `]WYb  
K ]YXYf\c`i b[ ghÅhYfb`UV"@"@Ui h`Y]bYf`GhUh]gh]\_`XYg? fUzhZU\fh!  
6i bXYgUa hYg`f? 65Ł`k UfYb`ja `J\ f`&\$&%`fi bX`%%ž\$( `i `XYf  
J Yf\_Y\fgi bZÀ`Y`Ui Z'5`\_c\c`a ]ggVfUi W`ni fØW\_ni ZØ\fybžk Ug`X]Y  
K ]W h][ \_Y]h`XYf`\_cbgYei YbhYb`5\bXi b[ `gc`WYf`8Y`\_hY  
i bhYfghfY]W h"

8YhU]`g

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