

GhUUhgY]b [ f]ZZ']b '@Ò\ b VYf [ .  
GhUUhgVYUi ZhfU[ hYf'gc ``6Øf[ Yfa Y]ghYf  
YfgYhnYb

8 Ug'F D'; ]Y»Yb'gYhnh'UV'C \_hcVYf'Y]bYb'GhUUhgVYUi ZhfU[ hYb  
]b '@Ò\ b VYf[ 'Y]bž'i a 'Xf]b[ YbXY': ]bUbndfcV`Ya Y`XYf  
; Ya Y]bXY'ni ``ÖgYb"

⇒a 'bØfX`]WYb'?fY]g'@]a Vi f[ !K Y]'Vi f[ 'k ]fX`X]Y' \_Y]bY'; Ya Y]bXY  
@Ò\ b VYf[ 'j cb'Z]bUbn]Y`Yb'GWk ]Yf][ \_Y]hYb'ghUf\_'VYhfcZZYb''8 Ug  
FY [ ]Yfi b[ gdfÄg]X]i a ' ; ]Y»Yb'\Uh'bi b'VYgW`cggYbž'Y]bYb  
GhUUhgVYUi ZhfU[ hYb'Y]bni gYhnYbž'i a 'X]Y'5i Z[ UVYb'XYg  
6Øf[ Yfa Y]ghYfg'ni 'ØVYfbY\`a Yb''8]YgY'A U»bU\`a Y'\_ca a h]b  
Y]bYf'NY]hž']b'XYf'X]Y'; Ya Y]bXY'Yfbgh\UZh'i a \UbX'i b[ gZÄ\][ ' ]gh"

8]Y'G]hi Uh]cb']b '@Ò\ b VYf[ ' ]gh'U`Ufa ]YfYbXž'XU`X]Y'; Ya Y]bXY'gY]h  
&\$%\* '\_Y]bY' [ YdfØZhYb'`X\`fYgUVgW`ØggY'a Y\`f'Y]b[ YfY]W'h'\Uh"  
8]Yg`Y [ h'bU\`Yž'XUgg'X]Y'Z]bUbn]Y`Yb'DfcV`Ya Y'gY]h'X\`fYb  
i b[ Y`Ögh'V`YVYb'i bX`X]Y'; Ya Y]bXY'ni bY\`a YbX']b'Y]bY'@U[ Y  
[ Yfi hgW'h']ghž'X]Y'U`g'hY]'k Y]gY'nU\`i b[ gi bZÄ\][ 'VYgWf]YVYb  
k ]fX''8]Y`YhnhYb'9bhgWY]Xi b[ Yb'ni f': ]bUbn]Yfi b[ 'i bX  
JYfk U`hi b[ '\UVYb'g]W`U`g'Ui g[ YgdfcWYb'gWk ]Yf][ 'Yfk ]YgYbž  
i bX'Yg'ghY\`Yb'bi b'Yf\`YV`]WY'A U»bU\`a Yb'Ubž'i a 'XYf'Äi »Yfgh  
\_f]h]gWYb'Z]bUbn]Y`Yb'G]hi Uh]cb'ni 'VY[ Y[ bYb"

8]Y' B c hk YbX][ \_Y]h'Y]bYg  
GhUUhgVYUi ZhfU[ hYb

8]Y'9bhgWY]Xi b[ ž'Y]bYb'GhUUhgVYUi ZhfU[ hYb'Y]bni gYhnYbž'k i fXY  
Xi fW`XUg'FY [ ]Yfi b[ gdfÄg]X]i a '[ YhfcZZYbž'XU`X]Y  
?ca a i bU`Ui Zg]W'h'XYg'@UbX\_fY]gYg'X]YgY'A U»bU\`a Y'[ YZc fXYfh  
\UhY''`b'Y]bYf'A ]hY]i b[ 'XYg'F D'; ]Y»Yb'k ]fX'i bhYfghf]WYbž'XUgg

X]Y'; Ya Y]bXY`b]W h`b`XYf`@U[ Y`]ghž`X]Y`bc h k YbX][ Yb`GW f]hhY  
Y][ Ybgh`AbX][ `i bX`a` ]h`XYf`YfZc fXYf`]W Yb`8 f]b[ `]W`\_Y]h`ni  
i bhYfbY`a Yb`"8]Yg`ghY`h`a` ; Y[ YbgUhn`ni`XYb`9fk Ufhi b[ Ybž`X]Y  
Ub`ÖZYb`h]W Y`J Yfk U`hi b[ Yb`[ YghY`h`k YfXYbž`j cf`U`Ya` k Ybb`Yg  
i a`X]Y`Z]bUbn]Y`Y` ; Ygi bX`Y]h`Y]bYf`? ca` a` i bY`[ Y`h`

8Yf`GhUUhgVYUi ZhfU[ hY`gc`ni b`W gh`V]g`ni a` ' %`A`Äfn`&\$&) `h`h][  
gY]bž`k cVY]Y]bY`J Yf`Äb[ Yfi b[ `a` Ö[ `]W`\_Y]gh`"8 Ug`F D` ; ]Y» Yb`VYhcbh  
X]Y`8 f]b[ `]W`\_Y]h`X]YgYf`A U» bU`a` Y`i bX`Y`Vh`Y`fj`cfž`XUgg`X]Y  
; Ya Y]bXY`Ui ZX]Y`VYZf]ghYh`i`bhYfgh`Øhni b[ `Ub[ Yk`]YgYb`]ghž`i`a  
X]Y`Z]bUbn]Y`Yb`A ]gggh`AbXY`Ubni [ Y`Yb`i bX`a` Ö[ `]W`Yfk`Y]gY  
Y]bYb`?cbgc`X]Yfi b[ gd`Ub`ni`Ybhk`]W`\_Y`b`" `ϕ`XYb`Y`hnhYb`A`cbUhYb  
`UVYb`VYfY]hg`a`Ugg]Y`GdUfa`U» bU`a` Yb`[ Y[ f]ZYbž`k`]Y`X]Y  
GhfY]W`i b[ `b]W`h`Xf]b[ `]W`Yf`ϕ`j`Ygh]h]cbYb`i bX`5b`Y`Vi b[ Yb  
\_ca` a` i bU`Yf`GhYi Yfb`i bX` ; YVØ`fYb`

## DYfgdY\_h]j Yb`i bX`< YfUi gZc fXYfi b[ Yb

8]Y`Z]bUbn]Y`Y`?f]gY`]b`@Ø`bVYf[ `U`h`Ui`W`f`Y`W`h]W`Y`  
: fU[ YghY`i b[ Yb`Ui`Z[ Yk`cfZYb`"9g`V`Y]Vh`UVni`k`UfhYbž`cV`X]Y  
9bhk`]W`\_i b[ `XYf` `X]Ybgh`c`XYf`ghf`UZfY`W`h]W`Y`?cbgYei`YbnYb  
bU`W`g]W`n]Y`Yb`k`]fX`"V]g`Ub[ `]gh`X]Y`GhUUhgUb`k`U`hgW`U`Zh`b]W`h  
U\_h]j` `[ Yk`cfXYbž`XcW`X]Y`G]hi`Uh]cb`\_ÖbbhY`g]W` `[ Y[ YVYbYbZU`g  
ÄbXYfb`"8]Y`V]g`Yf][ Yb`GW f]hhY`XYf` ; Ya Y]bXY`i bX`]fY  
ϕYZZ]n]Ybn`VY]`XYf`6Yk`Ä`h][ i b[ `]`fYf`Z]bUbn]Y`Yb  
5b[ Y`Y[ Yb`Y]hYb`ghY`Yb`bi b`Ui`ZX`Ya`DfØZghUbX`

Ni a`Y`hn][ Yb`NY]hdi b\_h]gh`6Øf[ Yfa`Y]ghYf` : fUb`\_`GW`a` ]Xh`fGD8`Ł  
k`Y]hYf`]b`]a`5a`hž`ghY`h`Y`XcW`gY]h`A`U]Ui`Z[ fi bX`gY]bYf  
8]Ybghi`bZ`Ä`][ \_Y]h`b]W`h`ni`f`J`YfZØ[ i b[ "J`YfhfYhYb`k`]fX`Yf`j`ca  
9fghYb`6Y][ YcfXbYhYb`K`c`Z[ Ub[ ` ; fØb`f7`8I`Łž`XYf`g]W`i`a`X]Y  
U`h`Ä[ `]W`Yb`5b[ Y`Y[ Yb`Y]hYb`XYf` ; Ya Y]bXY`\_Øa`a`Yfh`"8]Y  
[ Y[ Ybk`Äfh][ Yb`i`a`gh`AbXY`nY][ Ybž`XUgg`]b`XYf  
; Ya Y]bXY]Yfk`U`hi b[ `Y]b`[ fc» Yf`<UbX`i b[ gVYXUfZ`VYghY`h`

8]Y`G]hi`Uh]cb`]b`@Ø`bVYf[ `j`YfXYi`h`]W`h`X]Y`<YfUi`gZc`fXYfi`b[ Ybž  
j`cf`XYbYb`j`]Y`Y`\_`Y]bY` ; Ya Y]bXYb`]b`8Yi`hgW`UbX`ghY`Ybž  
]bgVYgcbXYfY`k`Ybb`Yg`i`a`Z]bUbn]Y`Y`GhUV]`]h`h`i`bX`

UXa ]b]ghfUhj] Y'9Z]n]Ybn'[ Y\h"K Å\fybX'XYf'GhUUhgVYUi ZhfU[ hY  
\Y'ZYb'gc`žX]Y'G]hi Uh]cb'ni'ghUV]`g]YfYbž]gh'X]Y': fU[ Yž'k ]Y'gc`W  
Y]b'9]b[ fY]ZYb`Ub[ Zf]gh][ 'ni'Y]bYf'bUW\U'h][ Yb'@Øgi b[ 'ZØ\fyb  
\_Ubbž]cb'Ybcfa Yf'6YXYi hi b[ 'ZØf'X]Y'Ni \_i bZh'XYf'GhUXh'i bX  
]\fyf'9]bk c\bYf"

## GW\`i ggV`]W\_`Ui Z`X]Y`9b hk ]W\_`i b[ Yb

8]Y'9]bgYhni b[ 'Y]bYg'GhUUhgVYUi ZhfU[ hYb' ]b'@Ø\bVYf[ '\_ØbbhY'Y]b  
DfÅnYXYbnZU``ZØf'UbXYfY'; Ya Y]bXYb' ]b'Å\b`]WYb  
GWk ]Yf][ \_Y]hYb'k YfXYb""8]Yg'nY][ h'b]W'h'bi f'X]Y'A Ø[ `]W\_`Y]hYb  
XYf'\Ygg]gWYb'; Ya Y]bXYcfXbi b[ ž'gcbXYfb'Ui W'X]Y  
Bchk YbX][ \_Y]h'Y]bYg'i a g]W'h][ Yb'A UbU[ Ya Ybhg'ØZYbh]WYf  
: ]bUbnYb""?`Uf' ]ghž'XUgg'X]Y`\_ca a YbXYb'A cbUhY'ZØf'X]Y  
; Ya Y]bXY'YbhgWY]XYbX'gY]b'k YfXYbž'i a 'Y]bY'dcg]hj Y'K YbXY' ]b  
]\fyf'<Ui g\U'hg`U[ Y'ni 'YffY]WYb"

8]Y'G]hi Uh]cb' ]b'XYf'; Ya Y]bXY'@Ø\bVYf[ 'gd]Y[ Y'h'Y]bY'h]YZYfY  
DfcV`Ya Uh]\_k ]XYfž'X]Y'j ]Y'Y`\_Y]bYfY'?ca a i bYb' ]b'8Yi hgW`UbX  
VYhf]Zh'"8Yf'5i gVUi 'XYf'\_ca a i bU'Yb'8]YbghY]ghi b[ Yb'i bX'X]Y  
[ 'Y]W'nY]h][ Y'<Ui g\U'hg`cbgc`X]Yfi b[ 'ghY`Yb' ]a a Yf'k ]YXYf  
[ fc»Y'<YfUi gZcfXYfi b[ Yb'XUf"6YgcbXYfg]b'`ÅbX`]WYb  
; Y[ YbXYb'g]bX'X]Y'Z]bUbn]Y`Yb'Gd]Y'fÅi a Y'cZh'gY\ f'VY[ fYbnhž  
k Ug'ni 'Y]bYf', VYfgW'i `Xi b[ 'i bX`YhnhYbX`]W'Ui W'ni 'Y]bYf  
NU\`i b[ gi bZÅ\][ \_Y]h'ZØ\fyb'\_Ubb""8Yf'8fi W\_`Ui Z`X]Y  
?ca a i bU'j Yfk U'hi b[ Ybž'gck c`\`gcn]U'dc`h]gWY'U'g'Ui W  
]bZfUghfi \_hi fY`Y'5bZcfXYfi b[ Yb'ni 'YfZØ`Ybž'k ÅWgh'ghYh][ ž  
k Å\fybX'X]Y'9]bbU\ a Yb'ghU[ b]YfYb"

9]b][ Y'?ca a i bYb'j Yfgi WYbž']\fy'Z]bUbn]Y`Y'G]hi Uh]cb'Xi fW  
]bbcj Uh]j Y'5bgÅhnY'ni 'j YfVYggYfbž'k ]Y'Yhk U'Xi fW'X]Y  
9]bZØ\fi b[ 'j cb'6Øf[ Yf\Ui g\U'hYb'cXYf'X]Y'GhÅf\_i b[ ``c\_U'Yf  
K ]fhgWUZhg]b]h]Uh]j Yb""8cW' ]b'j ]Y'Yb': Å`Yb'ZY\`Yb'X]Y  
FYggci fW'b'cXYf'XUg'bchk YbX][ Y': UWk ]ggYbž'i a 'X]YgY'5bgÅhnY  
YfZc`[ fY]W'i a ni gYhnYb"

: ]bUbn]Y`Y'G]hi Uh]cb'XYf'?ca a i bY.'9]b

# 。 VYfV`]W\_

8]Y'; Ya Y]bXY'@0\bVYf[ '\Uh'gY]h'&\$%\*`\_Y]bY' [ Ydf0ZhYb  
»\fYgUVgWk`0ggY'j cf[ Y`Y [ hž'k Ug'Ui Z[ fUj ]YfYbXY'Z]bUbn]Y`Y  
DfcV`Ya Y`\]bXYi hYh"9]b'gc`WkYg'J YfgAi a b]g' ]gh]b'8Yi hgWk`UbX  
b]Wk'higY`hYb'i bX`\_Ubb'ni `Y]bYa `J Yf'i gh'XYg'J YfhfUi Ybg']b`X]Y  
\_ca a i bU`Y`J Yfk U`hi b[ `Z0\fyb""8]Y'; Ya Y]bXY`\_Ubb'g]Wk`b]Wk`h  
i a `U`Y`Z]bUbn]Y`Yb'5gdY`\_hY`\_0a a a Yfb'/Ui Wk`XYf`HYi ZY`g\_fY]g  
j cb'g]b\_YbXYb'9]bbU\ a Yb'i bX'ghY][ YbXYb'5i g[ UVYb'gd]Y`h`\]Yf  
Y]bY`k YgYbh]Wk`Y`F c`Y"

»Y]bYf`U`hi Y`Yb'5bU`mgY`XYf`\_ca a i bU`Yb': ]bUbnYb']b`<YggYb  
k i fXY`ZYgh[ YghY`hž'XUgg'j ]Y`Y'; Ya Y]bXYb`Y]bYb'5bgh]Y[ `]\fYf  
GWk`i`XYb'j YfnY]Wk`bYbž'i bhYf`UbXYfYa `Xi fWk`i bj cf\Yf[ YgY\YbY  
5i g[ UVYb`]a `6YfY]Wk`XYf`»ZfUghfi `\_hi f'i bX`Gcn]U`Y]ghi b[ Yb"  
@Ui h`Y]bYa `6Yf]Wk`h'XYg`<Ygg]gWk`Yb`GhAXhY!`i bX  
; Ya Y]bXYVi bXYg`0VYf`X]Y`?ca a i bU`Z]bUbn]Yfi b[ `]b`<YggYbž  
\UVYb`Y]b][ Y`?ca a i bYb`GWk`k ]Yf][ \_Y]hYbž'X]Y`5i ZU[ Yb`Z0f`X]Y  
<Ui g\U`hgZ0\fi b[ `ni `YfZ0`Yb""8]YgY`9bhk ]W\_`i b[ '\Uh']b'j ]Y`Yb  
: A`Yb'ni `Y]bYf`»hYfj Ybh]cb`Xi fWk`\0\YfY`J Yfk U`hi b[ gVY\0fXYb  
[ YZ0\fhž`A\b`]Wk`k ]Y`Yhnh']b`@0\bVYf[ "

## J Yf[ `Y]Wk`a ]h'j Yf[ Ub[ YbYb`»hYfj Ybh]cbYb

8]Y`»hYfj Ybh]cb`XYg`F Y[ ]Yfi b[ gdfA`g]X]i a g'; ]Y»Yb']b`@0\bVYf[  
\Uh'DUfU`Y`Yb'ni `Zf0\YfYb`A U»bU\ a Yb']b`<YggYbž']bgVYgcbXYfY  
ni f`G]hi Uh]cb']b`G]Y[ VUWk`ž'k c`Y]bY`A\b`]Wk`Y`B chg]hi Uh]cb`&\$&\$  
ni f`6YghY`i b[ `Y]bYg`GhUUhgVYUi ZhfU[ hYb`Z0\fhY""»VY]XYb': A`Yb  
k Uf`X]Y`Z]bUbn]Y`Y`@U[ Y`XYf`?ca a i bY`\_f]h]gWk`ž'i bX`X]Y`ZY\`YbXY  
<UbX`i b[ gZ0\][ \_Y]h'XYg'; Ya Y]bXYj c fghUbXg`k i fXY`U`g'; fi bX`Z0f  
X]Y`9]b[ f]ZZY`Ub[ YZ0\fh"

8]Y`I a ghAbXY`i bhYfgWk`Y]XYb'g]Wk`Y`XcWk`. »G]Y[ VUWk`k Uf`XYf  
60f[ Yfa Y]ghYf`Ui Z[ fi bX`j`cb`?fUb`\Y]h'b]Wk`h`\UbX`i b[ gZ0\][ ž  
k A\fybX`X]Y`DfcV`Ya Y`]b`@0\bVYf[ `Y\Yf`ghfi `\_hi fY`Yf`BUhi f`g]bXž  
VYX]b[ h`Xi fWk`0VYf`»\fY`\]bk Y[ `ZY\`YbXY`9]bbU\ a Yb'i bX  
j Yfa i h]Wk`Ui Wk`A Ub[ Y`Z]bUbn]Yfi b[ ""8]Y`?i fnZf]gh][ \_Y]h'XYf  
»hYfj Ybh]cbYb`»Aggh`XUfUi Z'gWk`]Y»Ybž'XUgg`X]Y`6Y\0fXYb

VYghfYVh'g]bXž'gWbY``ni '\UbXY`bž'i a 'XUg'J YfhfUi Yb`XYf'6Øf[ Yf  
i bX`X]Y`i b\_h]cbgZÅ\][ \_Y]h'XYf'J Yfk U`hi b[ `ni `g]WXYfb"

8]Y`<YfUi gZcfXYfi b[ `ZØf'@Ø\ bVYf[ `i bX`X]Y`?ca a i bU] Yfk U`hi b[  
k ]fX`XUf]b`VYghY\Ybž`X]Y`; fØbXY`ZØf`X]Y`Z]bUbn]Y`Yb  
GWk ]Yf][ \_Y]hYb`ni `]XYbh]Z]n]YfYb`i bX`bUW\U`h][ Y`@Øgi b[ Yb`ni  
Ybhk ]W\_Y`bž'i a `Y]bY`YfbYi hY`ϕhYfj Ybh]cb`]b`XYf`Ni \_i bZ`ni  
j Yfa Y]XYb``Bi f`Xi fW`Y]bY`hfUbgdUfYbhY`i bX`n]Y`[ Yf]W`hYhY  
<Ui g\U`hgZØ\fi b[ `\_Ubb`XUg'J YfhfUi Yb`XYf'6Øf[ Yf  
ni fØW\_[ Yk cbbYb`k YfXYb"

8YhU]`g

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