

B Uhc `Yf\ Ò\ h'G]W\ Yf\ Y]hgghi ZY `]b  
; Y]`Yb\_]fW\ Yb. `J c fg]W\ hga U» bU\ a Y  
Yf\_`Àfh

B Uhc `Yf\ Ò\ h'G]W\ Yf\ Y]hgghi ZY `]b ; Y]`Yb\_]fW\ Yb `Ui Z'7\ Uf`]Y  
k Y[ Yb`a Ò[ `]W\ Yf`6YXfc\ i b[ Yb" `J c fg]W\ hga U» bU\ a Y`ZØf  
A ]hUfVY]hYf"

⇒a `bcfXf\Y]b!k YghZÀ`]gW\ Yb ; Y]`Yb\_]fW\ Yb `U h'X]Y `B 5HC `Y]bY  
Yf\YV`]W\ Y`9f\ Ò\ i b[ `XYf`G]W\ Yf\ Y]hgghi ZY `Ub[ Y\_ØbX][ hzi bX`nk Uf  
X]Y`nk Y]h[ fØ» hY`Ghi ZY `7\ Uf`]Y" `8]YgY `A U» bU\ a Y`k i fXY`]b  
F YU\_h]cb`Ui Z'gdYn]Z]gW\ Y`bUW\ f]W\ hYbX]Ybgh]W\ Y`<]bk Y]gY  
Yf[ f]ZYbž`X]Y`Ui ZY]bY`dchYbn]Y``Y`6YXfc\ i b[ `]\]bk Y]gYb" `@Ui h  
Y]bYa `GdfYW\ Yf`XYg`@ Zhk UZYbghØhndi b\_hg`k i fXYb`U`Y`b]W\ h  
\_f]h]gW\ Yb`A ]hUfVY]hYf`j c fgc f[ `]W\ `bUW\ `<Ui gY`[ YgW\ ]W\_hzi a `X]Y  
G]W\ Yf\ Y]h`XYf`j YfV`Y]VYbXYb`C dYfUh]cbYb`ni `[ Yk À\ f`Y]ghYb"

8]Y`9b hgW\ Y]Xi b[ `ni f`9f\ Ò\ i b[ `XYf`G]W\ Yf\ Y]hgghi ZY `Vf]b[ h  
[ Yk ]ggY`i bg]W\ Yf\ Y]hYb`a ]h'g]W\ `i bX`VYXUfZ`Y]bYf`bÀ\ YfYb  
6YhfUW\ hi b[ " `G]W\ Yf\ Y]hgYi dYfhYb`i bX`5bk c\ bYf`VYcVUW\ hYb`X]Y  
G]hi Uh]cb`Ui Za Yf\_gUa ž`XU` ; Y]`Yb\_]fW\ Yb `U`g`GhUbXcfh`XYg  
Z]Y[ YbXYb` : fØ\k UfbgmghYa g`5k UWg`f5]fVcfbY`9Uf`m`K Ufb]b[ `UbX  
7cbhfc`GmghYa Łj cb`ghfUhY [ ]gW\ Yf`6YXYi hi b[ `]gh" `8]Y`Xcfh  
ghUh]cb]YfhYb`6cY]b[ !+\$+!A UgW\ ]bYb`gd]Y`Yb`Y]bY`nYbhfU`Y`F c``Y  
VY]`XYf` , VYfk UW\ i b[ `XYg`@ ZhfUi a gž]bXYa `g]Y`dchYbn]Y``Y  
6YXfc\ i b[ Yb`ZfØ\ nY]h[ `Yf\_YbbYb"

G]W\ Yf\ Y]hgghi ZY `7\ Uf`]Y`i bX`] \ fY  
6YXYi hi b[

8]Y`G]W\ Yf\ Y]hgghi ZY `7\ Uf`]Y`g][ bU`]g]Yfh]a `B 5HC!`Jf[ cbž`XUgg  
VYfY]hg`Y]b`J c fZU``ghUhh[ YZi bXYb`U h'cXYf`X]Y`K U\ fgW\ Y]b`]W\ \_Y]h

hYffc f]gh]gWk Yf'5\_hj] ]hÀhYb'U'g'\cWk'Y]b[ YgWk Àhnh'k ]fX''8]Yg']gh  
ØV'jWk Yfk Y]gY'Y]b'XYi h]Wk Yg'NY]Wk Yb'XUZØfž'XUgg'XYf'B5HC!  
6YfY]Wk'U'g'VYgcbXYfg'[ YZÀ\ fXh'VYhfUWk hYh'k ]fX''8YbcbWk  
j Yfg]Wk YfhY'XYf'GdfYWk Yf'XYf'5]f'6UgYž'XUgg'Yg'\_Y]bYb'; fi bX'ni f  
6Ygcf[ b]g[ YVYž'i bX'Yf'\_ÀfhYž'XUgg'Yg'g]Wk'YX][ 'j]Wk'i a'Y]bY  
J c fg]Wk hga U» bU\ a Y'\UbX'Y''; YbUi YfY'8YhU]'gž'X]Y'ni'X]YgYf  
YbhgWk Y]XYbXYb'9f\Ø\i b[ 'ZØ\fhYbž'k i fXYb'j cb'XYb'6Y\ØfXYb  
YXcWk' b]Wk'h'cZZYbVUfh"

8]Y'Dc`nY]'gh]b'; Y]'Yb\_]fWk Yb'YVYbZU`g'U\_hj] 'i bX'VYghÀh][ hY  
]\fYb'9]bgUhn'Ub'XYf'6Ug]g''8]Y' [ YbUi Yb'5V`Ài ZY'i bX'X]Y'5bnU\`  
XYf'Y]b[ YgYhnhYb'Dc`nY]\_fÀZhY'V`Y]VYb'YXcWk'i bhYf'J YfgWk'i gg"  
J cf'c fh'k i fXYb'Dc`nY]k U[ Yb' [ Yg]Wk hYh'i bX'X]Y'G]Wk Yf\Y]hgghi ZY  
7'XYi h]Wk'Ub'A cb]hcY'i bX'HUZ' b'Ub'XYf'Ni ZU\fh'ni a'; Y`ÀbXY  
Ub[ YnY][ h"

## 8]Y'F c`Y'XYg'5k UWg!GmghYa g

8 Ug'5k UWg!GmghYa 'b'; Y]'Yb\_]fWk Yb'fYdfÀgYbh]Yfh'Y]bY'XYf  
ZcfhgWk f]hh]Wk ghYb'HYWk bc'c [ ]Yb'ni f'@ ZhfUi a ØVYfk UWk i b[ "'A ]h  
Y]bYf'F Y]Wk k Y]hY'j cb'V]g'ni '- &) \$?'`ca YhYfb'g]bX'X]Y  
i a [ YVUi hYb'6cY]b[ !+\$+'`b'XYf'@U[ Yž'UbXYfY': 'i [ nYi [ Y]'b'a Y\ f  
U'g'(\$ \$?'`ca YhYf'9bhZYfbi b[ 'ni'cfhYb'i bX'ni' ]XYbh]Zn]YfYb"  
8]YgY': À\][ \_Y]h'a UWk h'XUg'GmghYa 'ni'Y]bYf'Z]Y[ YbXYb  
?ca a UbXcnYbhfU'Yž'X]Y'b]Wk h'bi f'XUg'B5HC!6ØbXb]g' ]bZcfa ]Yfhž  
gcbXYfb'Ui Wk'VY] ]bhYfbUh]cbU'Yb'9]bgÀhYb'k ]Y'ja'6U`\_Ub!  
?cbZ]\_h'cXYf' ]b'5Z[ \Ub]ghUb'Y]bY'GWk'ØggY'fc`Y' [ Ygd]Y'h'\Uh''8]Y  
B5HC'\Uh'gc[ Uf'\fY'A UgWk]bYb'bUWk'XYa', VYfZU`F i gg'UbXg'Ui Z  
X]Y'I \_fU]bY'j cfØVYf[ Y\YbX'bUWk'Fi a Àb]Yb'j Yf'Y[ hž'k Ug'X]Y  
K ]Wk h][ \_Y]h'X]YgYf'@ ZhØVYfk UWk i b[ g[ fi ddY'k Y]hYf  
i bhYfghfY]Wk h"

⊕ XYb'YhnhYb'K cWk Yb' [ UV'Yg'VYfY]hg'6Yf]Wk hY'ØVYf'Yhk U[ Y  
GUVchU[ Yj Yfgi Wk'Y'Ub'6i bXYgk Y\ fghUbXcfhYb''8]YgY'6YXYb\_Yb  
k i fXYb'Xi fWk'Y]bYb'G]Wk Yf\Y]hgj cfZU`Ua'K Uggyfk Yf'\_XYf  
@ Zhk UZZYb\_UgYfbY'?Ò'b!K U\ b'j YfghÀf\_hž'VY]'XYa'XYf'J YfXUWk h  
Y]bYf'a Ø[ 'j]Wk Yb'J Yfi bfY]b][ i b[ 'XYg'Hf]b\_k Uggyfg'Ui Z\_Ua''5i Wk  
]a' l a ZY'X'XYg': 'i [ \UZYbg'; Y]'Yb\_]fWk Yb'k i fXYb'j YfXÀWk h][ Y

6YcVUW\hi b[ Yb`[ Ya UW hž`YXcW`\_cbbhY`bUW`6YzFU[ i b[ Yb  
Y]bYg`b` ; Yk U\fgUa` [ Ybca a YbYb`bX]j ]Xi i a g`\_Y]bY  
6YghÅh][ i b[ `Z0f`Y]bYb`g]W\Yf\Y]hgYf`Yj UbhYb`J cfZU``[ Y[ YVYb  
k YfXYb"

8]Y`U`\_hi Y`Yb`9b h k ]W`\_i b[ Yb`]b` ; Y]`Yb`\_]fW\Yb`nY][ Ybž`k ]Y`Yfbgh  
X]Y`B5HC`6YXfc`i b[ Yb`Y]bgW\Åmhž`]bgVYgcbXYfY`]b`Y]bYf`NY]hž`]b  
XYf`[ Ycdc`]h]gW\Y`GdUbbi b[ Yb`k Y`hk Y]h`ni bY`a Yb`"A ]h`XYf  
9f\0\i b[ `XYf`G]W\Yf\Y]hgghi ZY`gc`Yb`U`Y`bch k YbX][ Yb  
A U» bU`a Yb`[ YhfcZZYb`k YfXYbž`i a`Y]bY`k Y]hYf\]b`g]W\YfY`i bX  
YZZ`\_h]j Y`J cfVYfY]hi b[ `Ui Z`a 0[ `]W\Y`6YXfc`i b[ Yb`ni  
[ Yk Å`f`Y]ghYb"

## G]W\Yf\Y]h`]a` : c`\_i`g

8]Y`9fY][ b]ggY`fi bX`i a`X]Y`B5HC!6Ug]g`]b` ; Y]`Yb`\_]fW\Yb`k YfZYb  
Y]b`@]W\h`Ui ZX]Y`\_ca`d`YI`Y`G]W\Yf\Y]hg`U[ Y`]b`9i`fcdU`"K Å`fYbX  
X]Y`G]W\Yf\Y]hg`fÅZhY`i bX`X]Y`B5HC`gY`Vgh`U`Yg`i bhYfbY`a Ybž`  
i a`a` 0[ `]W\Y`F]g]\_Yb`UVni k Y`fYbž`V`Y]Vh`X]Y`J Yfi bg]W\Yfi b[ `]b  
HY]`Yb`XYf`6Yj 0`\_Yfi b[ `YXcW`gd0fVUf``8]Y`Gcf[ Y`i a`G]W\Yf\Y]h  
i bX`X]Y`ghÅbX][ Y`K UW`gUa`\_Y]h]g]bX`H`Ya Ybž`X]Y`Ui W`]b`n]j ]`Yb  
[ YgY`gW\UZh`]W\Yb`8]g`\_i fgYb`]a`a`Yf`k ]YXYf`Ui Z[ Y[ f]ZZYb`k YfXYb`"  
8U`Yf`V]YhYh`X]YgYf`J cfZU``5b`Ugg`ni f`FYZYI ]cb`0VYf`X]Y  
[ Y[ Ybk Åfh][ Y`[ Ycdc`]h]gW\Y`@U[ Y`i bX`X]Y`J YfUbh k cfhi b[ ž`X]Y`a` ]h  
]bhYfbUh]cbU`Yb`G]W\Yf\Y]hga U» bU`a Yb`j YfVi bXYb`]gh"

## Dc`]h]gW\Y`i bX`[ YgY`gW\UZh`]W\Y

< ]bhYf[ f0bXY

8]Y`g]W\Yf\Y]hgdc`]h]gW\Y`@U[ Y`]b`9i`fcdU`]gh`]b`XYb`YhnhYb`J\`fYb  
Ub[ YgdUbbh`"b`gVYgcbXYfY`a`]h`XYa`6Y[ ]bb`XYg`i`\_fU]bY!`?cbZ]\_hg  
&\$%(`i bX`XYf`UbgW`]Y» YbXYb`9g`\_U`Uh]cb`bUW`XYa` , VYfZU``  
F i gg`UbXg`]a`J\`f`&\$&&`UVYb`g]W`X]Y`[ Ycdc`]h]gW\Yb  
GdUbbi b[ Yb`Yf\0`h`8]YgY`9b h k ]W`\_i b[ Yb`UVYb`XUni`[ YZ0`fhž  
XUgg`X]Y`B5HC`]fY`a`]hÅf]gW\Yb`? UdUn]hÅhYb`i bX`X]Y  
Ni`gUa`a`YbUfVY]hi bhYf`XYb`A ]h[ `]YXghUUhYb`j YfghÅf`\_h`U`h`8]Y  
9f\0\i b[ `XYf`G]W\Yf\Y]hgghi ZYb`Ui Z`B5HC!Gh0hndi b`hYbž`k ]Y`]b

; Y]Yb\_]fW\Ybž]gh]b`X]YgYa `?cbhYI h`ni `gY\Yb"

Ni g`h`n`]W\ `gd]Y`Yb`]bhYfbY`g]W\Yf\Y]hgdc`]h]gW\Y`8YVUhYb  
]bbYf\U`V`8Yi hgW\`UbXg`Y]bY`F`c``Y" `b`XYb``YhnhYb`d\`fYb`[ UV`Yg  
nU\`fY]W\Y`8]g\_i`gg]cbYb`ØVYf`X]Y`<YfUi`gZcfXYfi`b[ Yb`XYf`]bbYfYb  
G]W\Yf\Y]hž]bgVYgcbXYfY`]a`<]bV`]W\_`Ui`Za`Ò[`]W\Y`hYffc]f]gh]gW\Y  
6YXfc\i`b[ Yb`i`bX`\mVf]XY`?f]Y[ gZØ\fi`b[ ``8]Y  
G]W\Yf\Y]hgVY\`ØfXYb`a`ØggYb`ni`bY\`a`YbX`Ui`Z\_`ca`d`YI`Y  
6YXfc\i`b[ g`U[ Yb`fYU[ ]YfYbž`k`Ug`g]W\`]b`dfcU`\_h]j`Yb`A`U»`bU\`a`Yb  
k`]XYfgd]Y[ Y`h"

## 5`\_hi`Y``Y`G]W\Yf\Y]hg`U[ Y`]b`8Yi`hgW\`UbX

8]Y`G]W\Yf\Y]hg`U[ Y`]b`8Yi`hgW\`UbX`k`]fX`j`cb`j`YfgW\]YXYbYb  
`bgh]hi`hYb`fY[ Y`a`À»][`Yj`U`i`]Yfh"@Ui`h`XYa  
J`YfZUggi`b[ ggW\i`hnVYf]W\h`&\$&&`VYghY\`h`Y]b`Ub\U`hYbXYg`F]g]\_c  
Xi`fW`]g`Ua`]gh]gW\Y`9i`hfYa`]ghYbž`fYW\hgYI`hfYa`]gh]gW\Y`;`fi`ddYb  
gck]Y`Xi`fW`X]Y`i`b`cbj`Ybh]cbY``Yb`6YXfc\i`b[ Ybž`X]Y`a`]h  
7mVYfUb[ f]ZZYb`j`YfVi`bXYb`g]bX``8Yf`6Yf]W\h`\YVh`\Yfj`cfž`XUgg  
Ui`W`]bhYfbUh]cbU`Y`?cbZ]\_hYž`k`]Y`XYf`]b`XYf`i`\_fU]bYž`Gdi`fYb`]b  
XYf`g]W\Yf\Y]hgdc`]h]gW\Yb`5i`gf]W\hi`b[ `8Yi`hgW\`UbXg  
\]bhYf`UggYb`\UVYb"

8]Y`G]W\Yf\Y]hgVY\`ØfXYb`\UVYb`]fY`F`Yggci`fW`b`]b`XYb``YhnhYb  
d\`fYb`Yf\`Ø\`hž`i`a`[ Yn]Y`h`Ui`Z`X]YgY`6YXfc\bi`b[ g`U[ Yb`ni  
fYU[ ]YfYb" `8Ug`N]Y``]gh`Ygž`B`chZU``d`ÀbY`ni`cdh]a`]YfYb`i`bX`Y]b  
gW`bY``Yg`9]b[ fY]ZYb`VY]`dchYbn]Y``Yb`6YXfc\i`b[ Yb`ni  
Yfa`Ò[`]W\Yb" `5`\_hi`Y``Y`GhUh]gh]\_Yb`nY][ Ybž`XUgg`X]Y`9f\`Ø\i`b[ `XYf  
Dc`]nY]df`ĀgYbn`i`bX`X]Y`VYggYfY`J`YfbYhni`b[ `j`cb  
G]W\Yf\Y]hgVY\`ØfXYb`ni`Y]bYf`YZZ]n]YbhYfYb`;`YZU\`fYbUVk`Y\`f  
[ YZØ\`fh`\UVYb"

## HYW\bc`c`[ ]gW\Y`9b`hk`]W\_`i`b[ Yb`i`bX a`]`]h`Āf]gW\Y`F`YU`\_h]cbgZ`Ā\][`\_Y]h

8]Y`B`5`HC`\`Uh]b`XYb``YhnhYb`d\`fYb`j`Yfgh`Āf`\_h]b`a`cXYfbY  
HYW\bc`c`[ ]Yb`]bj`Ygh]Yfhž`i`a`X]Y`F`YU`\_h]cbgZ`Ā\][`\_Y]h`\`fYf

A ]`hÅfghfi \_hi fYb`ni`j YfVYggYfb"8Yf9]bgUhn`j cb`5k UWg!  
: `i [ nYi [ Yb`]gh`Y]b`HY]`X]YgYf`GhfUHY [ ]Y"8]YgY`A UgW]bYb`g]bX  
b]W`h`bi`f`ZØf`X]Y`@`ZhØVYfk UW`i b [ `ni ghÅbX][ ž`gcbXYfb`X]YbYb  
Ui W`U`g`?ca a i b]\_Uh]cbg\_bchYbdi b\_hY`]a`9]bgUhn`ž`i a  
9W`hnY]hXUHYb`Ub`GhfY]h\_fÅZhY`ni`ØVYfa`]hY`b"

9]b`k Y]hYfYf`5gdY\_h`g]bX`X]Y`Ui ZYbXYb`, Vi b [ Yb`i bX  
G]a i`Uh]cbYbž`X]Y`j cb`B5HC!GhUUHYb`Xi fW [ YZØ`fh`k YfXYbž`i a  
X]Y`F`YU\_h]cbgZÅ`][ \_Y]h`]a`9fbghZU``ni`hYghYb"8]Y`9f [ YVb]ggY  
X]YgYf`, Vi b [ Yb`Y`ZYb`XUVY]ž`GW`k UW`ghY`Yb`ni`]XYbh]Z]n]YfYb  
i bX`X]Y`GhfUHY [ ]Yb`\_cbh]bi ]Yf`W`Ubni dUggYb"8]Y`a ]`hÅf]gW`Y  
Ni gUa a YbUfVY]h`i bX`XYf`bZcfa Uh]cbgUi ghUi gW`]bbYf`U`V`XYf  
B5HC!GhUUHYb`k YfXYb`U`g`Yb`hgW`Y]XYbX`Ub [ YgY`Ybž`i a`X]Y  
G]W`Yf`Y]h`]a` [ YgUa hYb`6ØbXb]g`ni` [ Yk`Å`f`Y]ghYb"

8YhU]`g

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