

< G; : fY]VYf[ 'ghUfhYh'ghUf\_.' ( .&' !G]Y[  
[ Y[ Yb' < GJ '8 fYgXYb']b'XYf'C VYf`][ U

< G; : fY]VYf[ 'ghUfhYh'a ]h'Y]bYa '' ( .&' !<Y]a g]Y[ '[ Y[ Yb' < GJ  
8 fYgXYb']b'X]Y'bYi Y'C VYf`][ U!GU]gcb'i bX'nY][ h  
\_Åa dZYf]gWXY'9bhk ]W\_i b[ "

8]Y' < G; : fY]VYf[ '\Uh'Ua 'GUa ghU[ UVYbX']\fYb'GhUfh']b'X]Y  
C VYf`][ U'GUWgYb'a ]h'Y]bYa 'Y]bXfi W\_gj c''Yb'G]Y[ '[ YZY]Yfh''Ni  
; Ugh]b'XYf'\Y]a ]gWXYb' < U''Y'k Uf'XYf' < GJ '8 fYgXYbž'XYf']b'XYf  
j Yf[ Ub[ YbYb'GU]gcb'XYb'ZØbZhYb'D'Uhn']b'XYf'GUWgYb`][ U'VY'Y[ h  
\UhhY'' : fY]VYf[ '[ Yk Ubb'XUg'A UhW'a ]h'' ( .&' ž'XcW'XYf'G]Y[ 'k Uf  
b]W'hj cb'5bZUb[ 'Ub[ 'Yg]WXYfh''8]Y'YfghYb'A ]bi hYb'XYf'DUfh]Y  
nY][ hYbž'XUgg'Yg'ZØf'X]Y'; Ugh[ YVYf'Y]b'V]ggWXYb''Åb[ Yf'XUi YfhYž  
i a ]]bg'Gd]Y''ni 'Z]bXYb"

⊖'XYf'YfghYb' < U'VnY]h'VYbØh][ hYb'X]Y' < UbXVU''Yf'XYf' < G;  
: fY]VYf[ 'cZYbVUf'Yhk Ug'NY]hž'i a ]]b']\fYb'F\mh\ a i g'ni '\_ca a Yb"  
K Å\ fYbX'X]Y'Ni gWUi Yf']b'XYf' < U''Y'Ui ZXYb'YfghYb'HfYZZYf  
k UfhYhYbž'k Uf'X]Y'GdUbbi b[ 'gdØfVUf''8Yf' < GJ '8 fYgXYb'bi hnhY  
X]YgY'D\UgY'i bX'ghY''hY'XYb'; Ugh[ YVYf'j cf'Y]b][ Y  
< YfUi gZcfXYfi b[ Yb''8]Y'8UWgY'\_cbbhYb']a '@Ui ZY'XYf'YfghYb  
< U'VnY]h'YXcW']\fY'GhÅf\_Y'VYk Y]gYb'i bX'X]Y'?cbhfc''Y'ØVYf'XUg  
Gd]Y''ni fØW\_[ Yk ]bbYb"

9]b'ghUf\_Yf'5i Zhf]hh']b'XYf'nk Y]hYb' < U'VnY]h

B UWXYa 'X]Y'YfghY' < U'VnY]h'a ]h'Y]bYa '\_bUddYb'Di b\_hYghUbX  
YbXYhYž'V'Ø\hYb'X]Y': fY]VYf[ Yf'Gd]Y'Yf']b'XYf'nk Y]hYb' < U'VnY]h  
fY[ Y'fYW'h'Ui Z''5b[ YZØ\fhj cb']\fYf'ghUf\_Yb'8YZYbg]j Y'i bX'Y]bYa  
YZZY\_hj] Yb'5b[ f]Zggd]Y''ØVYffc''hYb'g]Y'X]Y'8fYgXbYf''8]Y  
Ni gWUi Yfž'X]Y'fi bX'' \$\$'Ni gWUi Yf'nÅ\hYbž'k UfYb'VY[ Y]ghYfh

j`cb`XYf`gd]Y`Yf]gW`Yb`@Y]ghi`b[`ž`X]Y`]\f`HYUa`]b`X]YgYf`  
YbhgW`Y]XYbXYb`D\UgY`XYg`Gd]Y`g`nY][`hY"

8]Y`<G;`:`fY]VYf[`VYY]bXfi`W`h`b]W`h`bi`f`Xi`fW`]\fY`]bX]j`]Xi`Y`Y`  
?`UggYž`gcbXYfb`Ui`W`Xi`fW`Y]b`ghUf`\_Yg`Ni`gUa`a`Ybgd]Y`"9g`  
gW`Y]bž`U`g`\`ÀhYb`X]Y`Gd]Y`Yf]b`XYf`<U`VnY]hdUi`gY`XYb`GW`U`hYf`  
i`a`[`Y`Y[`h`J`cf`U`Y`a`]a`?`cbhYfgd]Y`nY][`hYb`g]Y`j`]Y`HYa`dc`i`bX`  
9Z]n]Ybnž`k`Ug`XYb`5VghUbX`ni`a`];`Y[`bYf`gW`bY`j`Yf[`f`O»`YfhY`i`bX`  
YbhgW`Y]XYbX`Z`f`XYb`9bXghUbX`k`Uf"

## 8Yf`6`]W`\_`Ui`Z`X]Y`GU]gcb

8Yf`G]Y[`[`Y[`Yb`XYb`<GJ`8fYgXYb`]gh`b]W`h`bi`f`k`]W`h][`Z`f`X]Y`  
A`cfU`XYg`HYUa`gž`gcbXYfb`[`]Vh`Ui`W`Y]bYb`j`]Y`j`YfgdfYW`YbXYb`  
5i`gV`]W`\_`Ui`Z`X]Y`\_`ca`a`YbXYb`Gd]Y`Y`]b`XYf`C`VYf`][`U`"B`UW`XYa`  
5Vgh]Y[`]Ui`g`XYf`("`@[`U`k`c`Yb`X]Y`:`fY]VYf[`Yf`nY][`Ybž`XUgg`g]Y`]b`  
XYf`bYi`Yb`@[`U`\_`cb`\_i`ffYbnZ`A\][`g]bX`"8]YgY`6Y[`Y[`bi`b[`]U`h`  
Y]bXfi`W`\_`gj`c`][`YnY][`hž`XUgg`X]Y`A`UbbgW`UZh`XUg`DchYbn]U`\`Uhž`  
g]W`gW`bY`]b`XYf`bYi`Yb`i`a`[`YVi`b[`]Y]bni`Z]bXYb"

8]Y`:`Ubg`XYf`<G;`:`fY]VYf[`]\_`ÒbbYb`c`dh]a`]gh]gW`]b`X]Y`b`ÀW`ghYb`  
K`c`W`Yb`V`]W`\_`Yb`"9g`V`Y]Vh`gdUbbYbXž`k`]Y`g]W`X]Y`bYi`Yb`  
Gd]Y`ghfUhY[`]Yb`i`bX`X]Y`HYUa`W`Ya`]Y`]a`@Ui`ZY`XYf`GU]gcb`  
Ybhk`]W`\_`Y`b`k`YfXYb`"8Yf`:`c`\_i`g`]Y[`h`bi`b`XUfUi`Zž`X]Y`YfVfUW`hY`  
@Y]ghi`b[`]b`XYb`\_`ca`a`YbXYb`DUfh]Yb`ni`\_`cbgc`X]YfYb`i`bX`k`Y]hYf`  
Ub`XYf`HYUa`XmbUa`]\_`ni`UfVY]hYb"

þg[`YgUa`h`VYhfUW`hYh]gh`X]YgYf`G]Y[`]b]W`h`bi`f`Y]b`k`]W`h][`Yf`  
GW`f]h`Z`f`X]Y`<G;`:`fY]VYf[`]ž`gcbXYfb`Ui`W`Y]b`XYi`h`]W`Yg`  
NY]W`Yb`XUž`ž`XUgg`X]Y`A`UbbgW`UZh`VYfY]h`]ghž`g]W`X]b`XYf`  
C`VYf`][`U`GUW`gYb`ni`VYk`Y]gYb`"8]Y`<UbXVU`Yf`\UVYb`a`]h`]fYa`  
ghUf`\_Yb`5i`ZhU`\_`h[`]YnY][`hž`XUgg`g]Y`X]Y`<YfUi`gZcfXYfi`b[`]Yb`XYf`  
bYi`Yb`@[`U`UbbY`a`Yb`i`bX`a`Y]ghYfb`k`c`Yb"

9]b`k`Y]hYfYf`5gdY`\_`hž`XYf`X]Y`9i`d`cf]Y`i`a`X]YgYb`G]Y[`]Yf`\`Ò`hž`]gh`  
X]Y`F`ØW`\_`Y`f`j`cb`a`ch]j`]YfhYb`i`bX`hU`Ybh]YfhYb`Gd]Y`Yfbž`X]Y`a`]h`  
]\fYf`9fZU`fi`b[`]i`bX`]\fYa`?`ÒbbYb`ni`a`9fZc`[`]XYg`HYUa`g`  
VY]hfU[`]Yb`"8]Y`A`]gW`i`b[`]Ui`g`↑`b[`]Yb`HU`YbhYb`i`bX`YfZU`fYbYb`

: Ø\fi b[ ggd]Y`Yfb`\_ØbbhY`XYf`GW`ØggY`ni`Y]bYf`YfZc`[ fY]WXYb  
GU]gcb`k`YfXYb`"

## 8 ]Y`9b`hk ]W`\_i b[ `XYg`< UbXVU``g`]b`GUW`gYb

⇒a`@Ui`ZY`XYf`↘\fY`\Uh]g]W`XYf`< UbXVU``gdcfh`]b`GUW`gYb`ghUf`\_  
Yb`hk ]W`\_Y`hž`gck`c`\`Ui`Z5a`UhYi`f!`U`g`Ui`W`Ui`Z`Dfc]YVYbY`"8]Y  
C`VYf`][`U`GUW`gYb`]gh`Y]b`g][`b]Z`\_Ub`hYf`K`Y`h`VYk`Y`fV`]bb`Yf`U`V`XYg  
XYi`hg`W`Yb`< UbXVU``gž`]b`XYa`HY`Ua`g`Ui`g`XYf`FY[ ]cb`i`a`XYb  
5i`Zgh]Y[ ]b`\Ø`YfY`@[`Yb`\_`Äa`dZYb`"8]YgY`@[`U`V]Y`h`h`b]W`h`b`i`f  
Y]b`Y`D`Uh`Zc`fa`ZØf`h`U`Y`b`h]Y`f`h`Y`Gd]Y`Y`f`ž`gcb`XYfb`Ui`W`ZØf`X]Y  
9b`hk ]W`\_i b[ `c`\_U`Yf`J`YfY]b`Y`ž`X]Y`c`Zh`Ui`Z`Y]b`Y`Ub[`Y`Hf`UX]h]cb  
ni`fØW`\_V`]W`\_Yb`\_Øbb`Yb`"

9]b`6Y]gd]Y`ZØf`X]Y`6Y`XYi`hi`b[ `XYg`< UbXVU``g`]b`XYf`FY[ ]cb`]gh  
XYf`< 7`@Y]dn][`ž`XYf`U`g`Y]b`Yf`XYf`YfZc`[ fY]W`ghYb`J`YfY]b`Y  
8Yi`hg`W`\_Ub`Xg[ ]`h`i`b`X`n`U`\`fY]W`Y`H]h`Y`[`Yk`]bb`Yb`\_`c`b`b`hY`"8`Ug  
9b[`U[`Ya`Y`b`h`j`cb`J`YfY]b`Yb`k`]Y`XYf`<G;`:`fY]VYf[`nY][`h`X`Ug  
6Y`gh`f`VYb`ž`↑`b[`Y`H`U`Y`b`h`Y`ni`ZØf`XYfb`i`b`X`X]Y`6Y[`Y]gh`Y`fi`b[`ZØf  
< UbXVU``]b`GUW`gYb`ni`Yf`U`h`Yb`"

## 5 \_hi`Y``Y`Hf`Yb`Xg`]a`< UbXVU``gdcfh

9]b`Y`XYf`Ui`ZÄ`][`ghYb`9b`hk ]W`\_i b[`Yb`]a`< UbXVU``gdcfh`]gh`X]Y  
ni`b`Y`\a`Y`b`XY`Dfc`ZY`gg]cb`U`]g]Y`fi`b[`"⇒a`a`Yf`a`Y`\f`J`YfY]b`Y  
]bj`Y`gh]Y`f`Yb`]b`X]Y`5i`gV`]Xi`b[ ]`\f`Yf`Gd]Y`Yf`gck`]Y`]b`a`c`XYfb`Y  
Hf`U]b]b[`ga`Y`h`c`XYb`"8]Y`:`]hb`Y`gg`i`b`X`Uh`\`Y`h]g`W`Yb`:`Ä`Å][`\_Y]h`Y`b  
XYf`Gd]Y`Yf`j`Y`f`VY`gg`Yfb`g]W`ž`k`Ug`ni`X`mb`Ua`]g`W`Y`f`Yb`i`b`X  
gd`Ub`b`Y`b`XYb`Gd]Y`Yb`ZØ`f`h`"

Gh`Uh]gh]\_Yb`nY][`Yb`ž`X`Ugg`XYf`Ni`g`W`Ui`Y`f`ni`gd`fi`W`ZØf  
< UbXVU``gd]Y`Y`]b`XYb`Y`h`h`Yb`↘\fYb`ni`[`Y`b`c`a`a`Yb`\`Uh`ž`k`Ug  
gck`c`\`Xi`f`W`XYb`5i`Zgh]Y[`XYg`XYi`hg`W`Yb`< UbXVU``g`Ui`Z  
]b`h`Y`fb`Uh]cb`U`Yf`6Ø`b`Y`U`g`Ui`W`Xi`f`W`X]Y`6Yf]W`h`Y`f`gh`Uh`hi`b[ ]b  
gc`n]U`Yb`A`Y`X]Yb`V`Y`X]b[`h`]gh`"8`Yf`XYi`hg`W`Y`< UbXVU``\`Uh]b`XYb  
`Y`h`h`Yb`↘\f`n`Y`\`b`h`Yb`n`U`\`fY]W`Y`9f`Zc`[`Y`[`Y`ZY]Y`f`h`ž`Y]b`g`W`Y`Y`»`]W`  
XYf`?`ca`V]b`Uh]cb`j`cb`b`Uh]cb`U`Yb`A`Y]gh`Y`fg`W`U`Zh`Yb`i`b`X  
]b`h`Y`fb`Uh]cb`U`Yb`Hi`fb]Y`fg]Y[`Yb`ž`k`Ug`ni`Y]b`Ya`[`Y`ghY][`Y`f`h`Y`b`

hYfYggY`Ub`X]YgYa`GdcfhZØ\fh"

8]Y`<G;`: fY]VYf[`gd]Y`hXUVY]`Y]bY`YbhgWXY]XYbXY`F c``Y`Ui`Z  
fY[ ]cbU`Yf`9VYbYžXU`g]Y`X]Y`<UbXVU``hfUX]h]cb`]b`XYf`GhUXh  
k Y]hYf`YVhi`bX`Ui`ZVUi`Yb`a`ÖW`hY`"

8]Y`F c``Y`XYf`;`Ya`Y]bgW`UZh`i`bX`XYf`:`Ubg

8]Y`i`bhYfghØhni`b[`Xi`fW`X]Y`:`Ubg`]gh`Y]b`YbhgWXY]XYbXYf`:`U\_hcf  
]a`<UbXVU``gdcfh`i`h`: fY]VYf[`\UVYb`X]Y`Ni`gW`Ui`Yf`Y]bY`ghUf`\_Y  
J YfV]bXi`b[`ni``]fYa`HYUa`ž`k`Ug`g]W`]b`XYf`VYY]bXfi`W`\_YbXYb  
?i`]ggY`j`cb`fi`bX`"``\$\$`6Ygi`W`Yfb`VY]a`"Y`hnhYb`Gd]Y`  
k]XYfgd]Y[`Y`h`Gc`W`Y`A`YbgW`Yba`Yb[`Yb`gW`UZYb`Y]bY  
Y]bn][`Ufh][`Y`5ha`cgd\`ÅfYž`X]Y`gck`c`\`X]Y`Gd]Y`Yf`U`g`Ui`W`X]Y  
HfU]bYf`a`ch]j`]Yfh"

Ni`XYa`Yb[`U[ ]YfYb`g]W`j`]Y`Y`J`YfY]bY`]b`gcn]U`Yb`Dfc`Y`\_hYb`i`bX  
j`Yfgi`W`Ybž`X]Y`;`Ya`Y]bgW`UZh`Xi`fW`Gdcfhni`j`YfY]bYb`"CV`Xi`fW  
GW`i`dfc`Y`\_hYž`K`cf`\_g\`cdg`c`XYf`c`ZZYbY`HfU]b]b[`gY]b\`Y]hYb`"XYf  
<UbXVU``V]YhYh`Y]bY`D`UhhZcfa`ž`i`a`X]Y`š`[`YbX`ni`ZØfXYfb`i`bX  
Y]bYb`[`Ygi`bXYb`@VYbggh]`ni`dfcdU[ ]YfYb`"8Yf`9fZc`[`j`cb  
A`UbbgW`UZhYb`k`]Y`XYf`<G;`: fY]VYf[`Yf]bbYfh`X]Y`A`YbgW`Yb`]b  
XYf`F`Y[ ]cb`XUfUbž`XUgg`HYUa`[`Y]ghž`8]gn]d`]b`i`bX`GdU»`YggYbn]Y`  
g]bXž`b]W`h`bi`f`]a`Gdcfhž`gcbXYfb`Ui`W`]a`@VYb`"

8]Y`J`YfV]bXi`b[`nk`]gW`Yb`J`YfY]b`i`bX`;`Ya`Y]bgW`UZh`]gh`ZØf`X]Y  
<G;`: fY]VYf[`Y]bY`k`Yfh]`c``Y`F`Yggci`fW`ž`i`a`"Ub[`Zf]gh][`HU`YbhY`ni  
Ybhk`]W`\_Y`b`i`bX`X]Y`Dcdi`Uf]h`h`X]Yg`<UbXVU``g`k`Y]hYf`ni`ghY][`Yfb`"

8YhU]`g

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