

@\_k !I bZU``Ua '6U\b\cZ'? YfdYb!< cffYa .  
: U\ fYf`gWk Yf`j Yf`Yhnh

9]b`G]`c`Ughk U[ Yb`ghØfnhY`VY]`? YfdYb!< cffYa `Ui Z`X]Y  
6U\bghfYW\_Y`5UWYb!`? Ò`b``: U\ fYf`gWk Yf`j Yf`Yhnhž`6Yf[ i b[  
YfZc`[ fY]Wk "

9]b`gWk YfYf`i bZU``YfY][ bYhY`g]Wk `Ua `: fY]hU[ a ]hhU[ `]b`XYf`BÀ\Y  
XYg`6U\b\cZg`? YfdYb!< cffYa ž`U`g`Y]b`G]`c`Ughk U[ Yb`j`cb`Y]bYf  
6fØW\_Y`ghØfnhY`i bX`Ui Z`X]Y`6U\bghfYW\_Y`5UWYb!`? Ò`b`Z]Y``8Yf  
( &!`À\`f][ Y`: U\ fYf`XYg`@\_k `Yf`]hhYb`XUVY]`gWk YfY`J Yf`Yhni b[ Yb  
i bX`k`i`fXY`i`bhYf`XYa`J YfXUWk`hž`i`bhYf`8fc[ Yb`ni`ghY`Ybž`]b`Y]bY  
l b\_]b\_] [ YZc[ Ybž`k`c`Yf`XYfnY]h]bhYbg]j a`YX]n]b]gWk`VYhfYi`h  
k`]fX"

8]Y`6Yf[ i b[ `XYg`@\_k ž`XYf`a`]h`(\$`HcbbYb`; fUbi`Uh`VY`UXYb`k`Ufž  
ghY`hY`g]Wk`U`g`Äi`» Yfgh`YfUi`gZcfXYfbX`YfUi`g`l`a`Y]bY  
J Yfi`bfY]b][ i b[ `XYf`6U\b[ `Y]gY`ni`j`Yf`]bXYfbž`a`i`gghY`X]Y  
@UXi`b[ `ni`bÅWk`gh`UVdi`a`dh`k`YfXYb``Ni`XYa`XfUb[ `8]YgY`Ui`g  
XYa`HUb`\_`XYg`: U\fnYi`[`g`]b`XYb`6cXYb`Y]bž`k`Ug`X]Y`G]hi`Uh]cb  
ni`gÄh`]Wk`YfgWk`YfhY``Hfchn`X]YgYf`?`ca`d`]\_Uh]cbYb`k`i`fXY`XYf  
@\_k`]b`XYf`B`UWk`h`[`Y[`Yb`&`l`f`YfZc`[`fY]Wk`[`YVcf[`Yb"

### 6U\bYI dYfhYb`ØVYfd`fØZYb`GWk`ÅXYb

⇒ a`Yf`k`]YXYf`\_ca`a`h`Yg`ni`GhØfi`b[`Yb`]a`6U\b]Yf`\_Y`fž`i`bX  
X]YgYf`J`cfZU``]b`?`YfdYb`]gh`Y]b`k`Y]hYfYg`6Y]gd]Y`XUZØf``B`UWk`XYf  
6Yf[ i b[ `XYg`: U\fnYi`[`g`VY[`UbbYb`9l`dYfhYb`XYf`8Yi`hgWkYb`6U\b  
a`]h`XYf`i`bhYfgi`Wk`i`b[ `XYf`GWk`ÅXYb`Ub`XYf`GhfYW\_Y``@Ui`h`Y]bYf  
GdfYWk`Yf]b`[`]Vh`Yg`<`c`Zbi`b[`Ybž`XUgg`XYf`B`U`j`Yf`\_Y`f`Ua`5VYbX  
ni`a`]bXYgh`Ui`ZY]bYa`;`Y]g`k`]YXYf`Ui`Z[`Ybca`a`Yb`k`YfXYb`\_Ubbž  
i`a`XYb`fY]gYbXYb`Y]bY`K`Y]hYfZU`fh`ni`Yfa`Ò[`]WkYb"

9]b`J cfZU``X]YgYf`5fh`Uhb]W`h`bi f`5i gk ]f\_i b[ Yb`Ui Z`XYb  
U\_hi Y``Yb`J Yf\_Y`f`z`gcbXYfb`k ]fZh`Ui W` : fU[ Yb`ni f`G]W`Yf`Y]h`Ui Z`  
8]Y`HUhgUW`Y`z`XUgg`XYf`@\_k !: U`fYf`a` Ò[ `]W`Yfk`Y]gY`8fc[ Yb  
\_cbgi`a` ]Yfh`U`h`z`gcf[ h`Z`f`ni g`À`h`n`]W`Y`6Ygcf[ b]g`Gc`W`Y`I` bZ`À`Y`  
YfZcfXYfb`b]W`h`bi f`gW`bY``Y`F`YU`\_h]cbYb`XYf`9]bgUhn`\_f`À`ZhY`z`  
gcbXYfb`Ui W`Y`]bY`i`a` ZUggYbXY`6Yk`Yfhi`b[ `XYf`I`fgUW`Yb`i`bX`  
a`Ò[ `]W`Yb`A`U`»bU`a`Yb`ži`a` `À`b`]W`Y`J`cfZ`À`Y`]b`XYf`Ni`\_i`b`Zh`ni`  
j`Yf`]bXYfb`"

## GW`k` ]Yf][`\_Y]hYb`k`À`fYbX`XYf`6Yf[ i`b[

8]Y`6Yf[ i`b[ `XYg`@\_k`k`Uf`[ Ydf`À[ h`j`cb`h`YW`b]gW`Yb`  
<YfUi`gZcfXYfi`b[ Yb``J`YfU`b`k`cfh`]W`Y`k`UfYb`[ Ynk`i`b[ Yb`ž`  
VYgcbXYfY`J`cf]W`h`ga`U`»bU`a`Yb`ni`Yf[ fY]Z`b`ži`a`  
g]W`Yfni`ghY``Yb`ž`XUgg`X]Y`@U`Xi`b[ `b]W`h`Ui`Z`X]Y` ; `Y]gY`[ Y`Ub[ hY`  
8Ug`5Vdi`a`dYb`XYg` ; fUbi`U`hg`k`Uf`Y]b`nY]hUi`Zk`YbX][`Yf`D`fc`nYggž`  
XYf`<UbX`]b`<UbX`a`h`XYf`6YgY]h][`i`b[ `j`cb`I`a`k`Y`hgW`À`XYb`Xi`fW`  
XYb`Ui`g`Ui`Z`bXYb`8]YgY`Xi`fW`[ YZ`f`h`k`YfXYb`a`i`gghY``8]Y`  
j`YfU`b`k`cfh`]W`Yb`6Yf[ i`b[ gZ]fa`Yb`UfVY]hYhYb`Yb[ `a`h`XYb`  
6Y`À`f`XYb`ni`gUa`a`Yb`ži`a`gck`c`X]Y`G]W`Yf`Y]h`XYf`  
6U`b`dUggU[ ]YfY`U`g`Ui`W`XYg` : U`fdYfgcbU`g`ni`[ Yk`À`f`Y]ghYb`"

8Ug`5i`ga`U`»XYf`GW`À`XYb`Ub`XYf`6U`b`ghfYW`\_Y`]gh`XYfnY]h`bcW`  
b]W`h`j`c`gh`À`bX][`[`Y`\_`À`fh`ž`i`bX`X]Y`9I`dYfhYb`XYf`8Yi`hgW`Yb`6U`b`  
UfVY]hYb`XUfUi`Z`]\b`ž`Y]bY`df`À`n]gY`9]bgW`À`mi`b[ `j`cfni`bY`a`Yb`  
8]Y`6YXYi`hi`b[ `Y]bYf`gW`bY``Yb`K`]YXYf`YfghY``i`b[ `XYg`  
6U`b`j`Yf`\_Y`fg`]gh`c`ZYbg]W`h`]W` `j`]Y`Y`DYbX`Yf`i`bX`FY]gYbXY`g]bX`  
XUfUi`Z`Ub[ Yk`]YgYb`ž`XUgg`g]Y`]\fY`N]Y`Y`c`bY`[ fc`»Y`J`Yfn`Ò[ Yfi`b[  
YffY]W`Yb`\_`Ò`b`Yb`"

8]Y`I`bZU``i`fgUW`Y`V`Y]V`h`Y]b`nYbhfU`Yg`H`Y`a`U`XYf`9fa`]h`i`b[ ``8]Y`  
Dc`nY]`U`h`XYb`@\_k !: U`fYf`b]W`h`bi`f`Ui`Z`8fc[ Yb`[ YhYghYh`z`  
gcbXYfb`Ui W`Y`UbXYfY`a`Ò[ `]W`Y` : U`hcfYb`ž`X]Y`ni`X]YgYa`  
gW`k`Yfk`]Y[ YbXYb`J`cfZU``[ YZ`f`h`i`U`VYb`\_`Ò`b`hYb`ž`i`bhYfgi`W`h``9]b`  
gc`W`Yg`9fY][`b]g`]gh`b]W`h`bi`f`Y]b` : U``j`cb`]bX]j`]Xi`Y``Yf`  
 : U`f`À`gg][`\_Y]h`ž`gcbXYfb`Ui W`Y`]b`5b`Ugg`Z`f` ; Ygdf`À`W`Y`Ø`VYf`X]Y`  
G]W`Yf`Y]h`]a`GhfU`»Ybj`Yf`\_Y`f`]bg[ YgUa`h`"

# 9]b`6`]W\_]b`X]Y`Ni`\_i`bZh

8]YgY`HfU[`ÒX]Y`nY][`h`XYi`h`]W`ž`k`]Y`Y]W`h`Yg`d`Ugg]YfYb`\_Ubbž`XUgg  
Y]b`A`ca`Yb`h`XYf`i`b`UW`hg`Ua`\_]h]`Yf`Yf`Yf`Yb`XY`:`c`[`Yb`Z0f`j`]Y`Y  
A`Ybg`W`Yb`\_`UVYb`\_`Ubb`"8]Y`9b`hk`]W`\_i`b[`Yb`fi`b`X`i`a`\_`X]Y`6Yf[`i`b[  
XYg`@\_k`i`b`X`X]Y`K`]YXYf`Yf`ghY`i`b[`\_`XYg`6U`b]`Yf`\_`Y`f`g`h`Y`Yb`]a  
A`]hhY`di`b`\_`h`XYf`6Yf]W`h`Yf`gh`U`hi`b[`"`,`\_`Y]W`nY]h][`\_`VY`Yi`W`h`Y`h`X]YgYf  
J`cf`ZU`X]Y`8f]b[`]W`\_Y]hž`X]Y`J`Yf`\_`Y`f`gg]W`Yf`Y]h`ni`\_`Yf`\_`Ò`Yb`i`b`X  
f][`c`f`c`g`Y`?`c`b`h`f`c`\_`Yb`Z0f`:`U`f`Yf`ni`\_`ja`d`Ya`Yb`h]Yf`Yb`ž`]bg`VY`g`c`b`XYfY  
]b`6Yni`[`\_`Ui`Z`8`fc[`Yb`\_`cbgi`a`"9g`V`Y]V`h`ni`\_`c`ZY`b`ž`XUgg`@`Y`f`Yb  
Ui`g`X]YgYa`\_`J`cf`ZU`X]Y`nc[`Yb`k`Yf`XYb`ž`i`a`\_`ni`\_`0b`Zh][`Y`i`b`Z`\_`Y`ni  
j`Yfa`Y]XYb`"

8Yf`J`cf`ZU`X]Yb`\_`XYf`6U`b`ghf`Y`W`\_Y`5U`W`Yb`!`?`Ò`b`[`]V`h`5`b`Ugg`ni`f  
9f`Ò`fh`Yfi`b[`]XYf`G]W`Yf`Y]hgf]W`h`b]Yb`]a`\_`J`Yf`\_`Y`f`"b`8Yi`hg`W`\_`Ub`X  
[`Y`h`Yb`ghf`Yb[`Y`J`cf`g`W`f]Z`h`Yb`Z0f`X`Yb`i`\_`0`h`Yf`j`Yf`\_`Y`f`ž`X]Y`i`b`h`Yf  
Ub`XYf`Ya`\_`X]Y`f`Y[`Y`a`À»][`Y`?`c`b`h`f`c`\_`Y`XYf`:`U`f`Yf`Ui`Z`8`fc[`Yb`c`XYf  
5`\_`c`\_`c`i`i`a`ZUgg`Yb`"8]Y`f`Y`W`h]W`Yb`\_`F`U`a`Yb`V`Y`X]b[`i`b[`Yb`g]b`X  
XUf`Ui`Z`Ui`g[`Y`Y[`hž`i`b`Z`\_`Y`k`]Y`X]Yg`Yb`ni`\_`j`Yf`\_`b`XYfb`"8Yf  
;`Yg`Y`hn[`Y`V`Yf`\_`U`h`X]Y`G`Ub`\_`h]c`b`Yb`Z0f`J`Yf`gh`Ò»`Y`[`Y[`Yb`X]Yg`Y  
J`cf`g`W`f]Z`h`Yb`Yf`\_`Ò`hž`i`a`\_`XYb`G`W`i`h`ni`ja`\_`G`h`f`U»`Yb`!`i`b`X  
G`W`]Yb`Yb]`Yf`\_`Y`f`ni`\_`[`Y`k`À`\_`f`Y]g`h`Yb`"@`Ui`h`Y]b`Yf`G`h`i`X]Y`X`Y`g`  
**6i`b`X`Y`g`Z`c`f`i`a`g`i`b`ZU`X`c`f`g`W`i`b**[`\_`Yf`Zc`[`h`X]Y`,`V`Y`f`d`f`0`Z`b[`]XYf  
J`Yf`\_`Y`f`g`h`Y]`b`Y`\_`a`Yf`ni`b`Y`\_`a`Yb`X`Ui`W`\_`Xi`f`W`\_`h`Y`W`b`c`c[`]g`W`Y  
<`]Z`ga`]hh`Y`ž`k`c`Xi`f`W`\_`Y]b`g]W`Yf`Y`g`:`U`f`Yb`i`b`h`Yf`9]b`Zi`gg`j`c`b  
8`fc[`Yb`Y`fg`W`k`Yf`h`k`Yf`XYb`gc`"

Ni`g`À`h`ni`W`\_`ni`\_`XYb`f`Y`W`h]W`Yb`\_`J`cf[`U`V`Yb`gd]Y`Yb`\_`Ui`W`\_`d`f`À`j`Yb`h]j`Y  
A`U»`b`U`\_`a`Yb`\_`Y]b`Y`Yb`hg`W`Y]X`Yb`XY`F`c`\_`Y`"6]`Xi`b[`g`\_`Ua`d`U[`b`Yb`i`b`X  
G`W`i`i`b[`Yb`Z0f`@\_k`!:`U`f`Yf`\_`UVYb`]b`\_`XYb`\_`Y`h`h`Yb`\_`\_`\_`Y`f`Yb`\_`Ub  
6`Y`X`Y`i`h`i`b[`]Y`k`c`b`b`Yb`"G`h`i`X]Yb`nY][`Yb`ž`XUgg[`i`h]b`Z`c`fa`]Yf`h`Y  
:`U`f`Yf`k`Yb][`Yf`[`Yb`Y][`h`g]b`X`ž`f]g`\_`Ub`h`Y`g`J`Yf`\_`U`h`Yb`\_`Ub`\_`XYb`\_`HU[`ni  
\_`Y[`Yb`"8]Y`**8Yi`hg`W`Y`;**Yg`Y`hn`]W`Y`\_`i`b`ZU`X`j`Yf`g]W`Y`f`i`b[`]Z0f`h  
f`Y[`Y`a`À»][`\_`D`f`c[`f`Ua`\_`a`Y`\_`Xi`f`W`\_`ž`i`a`\_`XUg`6`Y`k`i`g`g`h`g`Y]b`Z0f  
8`fc[`Y`ba`]g`g`V`f`Ui`W`\_`]a`\_`H`f`U`b`g`d`c`f`h`g`\_`h`c`f`ni`\_`g`W`\_`À`f`Z`Yb`i`b`X  
[`Y`Y][`b`Y`h`Y`<`]Z`g`Ub[`Y`V`c`h`Y`ni`\_`a`U`W`Yb`"G`c`\_`W`Y`\_`\_`\_`]h]U`h]j`Yb`g]b`X  
Yb`hg`W`Y]X`Yb`X`ž`i`a`\_`XUg`6`Y`k`i`g`g`h`g`Y]b`Z0f`X]Y`i`\_`Y`ZU`\_`f`Yb`\_`XYg`:`U`f`Y`bg  
i`b`h`Yf`8`fc[`Yb`Y]b`Zi`gg`ni`\_`gh`\_`f`\_`Yb`"

: c`[ Yb`ZØf`XYb`6U\ bVYhf]YV`i bX`X]Y

l a [ YVi b[

8Yf`i bZU``\UhhY`b]W`h`bi f`X]fY`\_hY`5i gk ]f`\_i b[ Yb`Ui Z`XYb`@\_k !  
: U\fyfž`gcbXYfb`Ui W`X`Ui Z`XYb`6U\ bVYhf]YV" B UW`X`Ya`Ghi fn`XYg  
: U\fnYi [ g`k`i fXYb`i a`ZUb[ fY]W`Y`G]W`Yf\Y]hgd fØZ b[ Yb  
Ub[ YcfXbYhž`i a`g]W`Yfni ghY`Ybž`XUgg`X]Y` ;`Y]gY`b]W`h`VYgW`ÅX][ h  
k`i fXYb`i bX`X]Y` ðZfUghfi`\_hi`f`]bhU`\_h]gh"9fghY`GW`Åmi b[ Yb`Y[ Yb  
bU\Yž`XUgg`X]Y`6Yhf]YVgi bhYfVfYW`i b[ Yb`Yf\YV`]W`Y  
k ]fhgW`UZh]W`Y`5i gk ]f`\_i b[ Yb`Ui Z`XYb` ;`ØhYfj`Yf`\_Y`f`nk ]gW`Yb  
5UW`Yb`i bX`?Ø`b`U`VYb`k`YfXYb"

B]W`h`bi f`X]Yf`6U\bj`Yf`\_Y`fž`gcbXYfb`Ui W`X`Y`i a`]Y[ YbXYb  
J`Yf`\_Y`fgk`Y[ Y`g]bX`VYhfc`ZYb" DYbX`Yf`i bX` ;`ØhYfhfUbgdcfhY  
a`ØggYb`a`]h`J`YfnØ[ Yfi b[ Yb`fYW`bYbž`i bX`Yg`]gh`ni`Yfk`UfhYbž  
XUgg`U`hYfbUhj`Y`F`ci`hYb`ØVYf`UghY`h`k`YfXYb"@\_U`Y`i`bhYfbY`a`Yb  
i`bX`DYbX`Yfž`X]Y`Ui`Z`Y]bY`ni`j`Yf`Ågg][ Y`5bV]bXi b[ `Ub[ Yk ]YgYb  
g]bXž`\_ØbbhYb`]b`XYf`\_ca`a`YbXYb`NY]hij`cf`<`YfUi`gZcfXYfi b[ Yb  
ghY`Yb"

5\_hi`Y`Y`8`UhYb`i`bX`GhUh]gh]\_Yb`ni`f`

J`Yf`\_Y`f`gg]W`Yf\Y]h

8]Y`J`Yf`\_Y`f`gg]W`Yf\Y]h]b`8Yi`hgW`U`bX`\Uh`g]W`]b`XYb`Y`hnhYb  
`U\fyb`Xi`fW`j`YfgW`]YXYbY`A`U`bU`a`Yb`j`YfVYggYfh"@Ui`h`XYb  
GhUh]gh]\_Yb`XYg`GhUh]gh]gW`Yb`6i`bXYgUa`hYg`[ UV`Yg]a`U\`f  
&`\$`&`fi`bX`&ž`+`A`j`]cbYb`J`Yf`\_Y`f`gi`bZ`Y`ž`k`cVY]`X]Y`NU`X`Yf  
J`Yf`\_Y`f`ghcXZ`Y`Ui`Z`&`,``,`[ Ygi`b`\_Yb`]gh"8]YgY`9bhk`]W`\_i`b[ Yb  
g]bX`Ui`Zj`Yfgh`Åf`\_hY`?`cbhfc`Yb`i`bX`GYbg]V`]g]Yfi`b[ g`Ua`dU[ bYb  
ni`fØW`\_ni`ZØ`fYb"8Yf`9]bgUhn`a`cXYfbYf`HYW`bc`c[ ]Yb`k`]Y  
8fc`bYb`i`bX`,`VYfk`UW`i`b[ ggmghY`a`Y`ni`f`,`VYfk`UW`i`b[ `j`cb  
J`Yf`\_Y`f`gj`YfghØ`Yb`[ Yk ]bbh`ni`bY`a`YbX`Ub`6YXYi`hi`b[ `i`bX  
\_ØbbhY`\_ØbZh][ `XUni`VY]hfU[ Ybž`Å`b`]W`Y`J`cfZ`Y`ni`j`Yfa`Y]XYb"

8]Y`5i`gk`]f`\_i`b[ Yb`j`cb`8fc[ Yb`]a`GhfU`Ybj`Yf`\_Y`f`g]bX`YVYbZU`g  
Y]b`fY`Yj`UbhYg`H`Y`a`U`,`VYf`\*`"\$`\$`\$`J`Yf`\_Y`f`gi`bZ`Y`Y`Å`f`]W`  
k`YfXYb`]b`8Yi`hgW`U`bX`a`]h`8fc[ Yb`Ua`GhYi`Yf`]b`J`YfV]bXi`b[

[ YVfUWk"8]Ygi bhYfghfY]Wk'hX]Y'8f]b[ `]Wk\_Y]hj cb'5i Z`Àfi b[  
i bX'dfAj Ybhj] Yb'A U» bU\ a Yb']a 'l a [ Ub[ 'a ]h'Gi WkhdFcV`Ya Yb  
i bhYf@\_k !: U\ fYfb' i bX'UbXYfYb'J Yf\_Y\ fghY]'bY\ a Yfb"8]Y  
?ca V]bUh]cb'Ui g'[ YgYhn`]WkYb'A U» bU\ a Yb' i bX'gcn]U`Yb  
=b]h]Uhj] Yb'\_ÒbbhY`Y]b`YbhgWkY]XYbXYf'GWk f]hh]b'F]Wkhi b[  
g]WkYfYfYf'GhfU» Yb' i bX'6U\ bghfYW\_Yb'gY]b"

8YhU]`g

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