

5 [ [ fYgg]j Y`8 ]YV]b`]a` < Ui dhVU\ b\ cZ  
< U``Y. : YghbU\ a Y`a ]h? ØW\ Yba YggYf

5 [ [ fYgg]j Y`&%! Å\ f][ Y`]b`<U``Y. `B UW\ `j Yfgi W\ hYa`8 ]YVghU\`  
a`]h; `UgZUgW\Y`i bX`K ]XYfghUbX`[ Y[ Yb`X]Y`Dc`]nY]  
ZYgh[ Ybca`a Yb"

⇒ a` <Ui dhVU\ b\ cZ< U``Y`fGUU`YĚ`\_Ua` Yg`Ua` GcbbhU[ ž`XYb`%, "  
5i [ i gh&\$&( ž`ni`Y]bYa` YfgW\ fYW\_YbXYb`J cfZU``ž`XYf`X]Y  
5i Za Yf\_gUa`\_Y]h`XYf`6i bXYgdc`]nY]`Ui Zg]W\`nc[ "]; Y[ Yb`%\*. \$\$  
I \ f`k`i fXY`Y]bY`&%! Å\ f][ Y`: fUi`[ Ya`Y`XYhž`X]Y`]b`Y]bYa  
8fc[ Yf]Ya Uf\_h`U[ [ fYgg]j`Ui ZhfUh`G]Y`\UhhY`K UfYb`Ybhc`YbXYhž`  
c\ bY`X]YgY`ni`VYnU\`Ybž`i bX`[ Yf]Yh]b`GW\k`]Yf][ \_Y]hYbž`U`g`g]Y  
VY]a`J Yf`UggYb`XYg`; YgW\ÅZh`j cb`Y]bYa`@UXYbXYhY`\_h]  
Ub[ YgdfcW\Yb`k`i fXY"

5bghUhh`g]W\`XYf`G]hi Uh]cb`ni`ghY``Ybž`nY][ hY`X]Y`Ā b[ Y`8Yi hgW\Y  
Y]bY`Yi hfYa`Y`5 [ [ fYgg]j ]hÅ`h`G]Y`\UhhY`Y]bY`; `UgZUgW\Y`]b`XYf  
< UbX`i bX`j Yfgi W\ hYž`XYb`8YhY`\_h]j`a`]h`Y]bYa`GW\`U[ `ni  
UhhUW\_]YfYb``8]YgY`[ Yk`U`hÅ]h][ Y`FYU`\_h]cb`k`Uf`bi`f`XYf`6Y`[ ]bb  
Y]bYf`i bUb[ Ya`YggYbYb`5i`gY]bUbXYfgYhni`b[ ž`X]Y`]a`a`Yf`k`Y]hYf  
Yg\_U`]YfhY"

### 9g\_U`Uh]cb`j`cf`XYb`5i [ Yb`XYf`DUggUb`hYb

8]Y`G]hi Uh]cb`bU\`a`Y]bY`XfUa`Uh]gW\Y`K`YbXi`b[ ž`U`g  
G]W\Yf\Y]hga`]hUfVY]hYf`XYf`6U\`b`gck`]Y`XYf`@UXYbXYhY`\_h]  
Y]b[ f]ZZYbž`i`a`X]Y`&%! Å\ f][ Y`Ui`Zni`\U`hYb``Hfchn`XYg`9]bhfYZZYbg  
XYf`6i bXYgdc`]nY]ž`X]Y`U`Ufa`]Yfh`k`i fXYž`j`Yf\]Y`h`g]W\`X]Y`: fUi  
k`Y]hYf\]b`U[ [ fYgg]j``K`]XYfgdYbgh][`k`Y\fhY`g]Y`g]W\`[ Y[ Yb`X]Y  
A`U»`bU\`a`Yb`XYf`6YUa`hYb`i`bX`nY][ hY`g]W\`i`b`\_ccdYfUh]j`ž`]bXYa  
g]Y`g]Y`k`]YXYf\`c`h`hfUh`i`bX`gW\`i`[ "

8]YgY`U[ [ fYgg]j Yb`<UbX`i b[ Yb`[ YdUUfh`a ]h`VY`Y]X][ YbXYb  
ÿi » Yfi b[ Yb`j YfUb`UgghYb`X]Y`6YUa hYbž`X]Y`† b[ Y`: fUi`ni`6cXYb  
ni`Vf]b[ Yb`i bX`g]Y`ni`ZYggY`b"K À\fybX`]\fYg`HfUbgdcfhg`ni`f  
bU\Y[ Y`Y[ YbYb`8]YbghghY`Y`k Y][ YfhY`g]Y`g]Wž`XYb`5bcfXbi b[ Yb  
: c`[ Y`ni`Y]ghYbž`k Ug`X]Y`G]hi Uh]cb`bi`f`k Y]hYf`j YfgW`ÀfZhY`" ÆfY  
k ]YXYf\c`hYb`6Y`Y]X][ i b[ Yb`i bX`8fc\i b[ Yb`[ Y[ YbØVYf`XYb  
Dc`]nY]VYUa hYb`k UfYb`b]W`h`ni`ØVYf\ØfYb`i bX`gc f[ hYb`ZØf`Y]bY  
Ub[ YgdUbbhY`5ha cgd\ÀfY"

; YZÀ\ f`]W`X Yg`GY`VghVYk i gghgY]b

6Y]Y]bYf`8i fW`gi W`i b[ `]\fYf`<UbXhUgW`Y`Yb`hXYW`hYb`X]Y  
Dc`]n]ghYb`Y]b`[ f]ZVYfY]hYg`?ØW`Yba YggYfž`k Ug`X]Y`; YZU\ fž`X]Y  
j cb`XYf`&%!À\ f][ Yb`Ui`g[ ]b[ ž`ni`g`Àh`]W`i`bhYfghf]W`"8]Y  
fYW`h]W`Yb`?cbgYei YbnYb`ZØf`]\f`J Yf\U`hYb`g]bX`[ fUj ]YfYbX`"G]Y  
k ]fX`k Y[ Yb`8]YVghU`\`a ]h`K UZZYbž`h`h]W`Ya`5b[ f]Z`Ui`Zi`bX  
K ]XYfghUbX`[ Y[ Yb`J c`ghfYW`i b[ gVYUa hYž`gck ]Y`6Y`Y]X][ i b[ `i`bX  
j Yfgi W`hYf`?ØfdYfj Yf`Yhni b[ `Ub[ YnY][ h"

8]Yg`]gh`b]W`h`bi`f`Y]b`6Y]gd]Y`ZØf`i b`\_cb`hfc``]YfhYg`J Yf\U`hYb`]a  
ØZZYb`h]W`Yb`FUi`a ž`gcbXYfb`k ]fZh`Ui`W`Y]b`@]W`h`Ui`Z`X]Y  
k UW`gYbXYb`<YfUi`gZcfXYfi b[ Yb`ž`a ]h`XYbYb`G]W`Yf\Y]hg`f`ÀZhY  
VY]`XYf`J YfVfYW`YbgVY`\_Àa dZ`b[ `cbZfcbh]Yfh]g]bX`" ðgVYgcbXYfY  
]b`ghUf`\_ZfYei Ybh]YfhYb`6YfY]W`Yb`k ]Y`6U`b\ØZYbž`k c`g]W`j ]Y`Y  
A YbgW`Yb`Ui`Z`U`hYbž`\_ØbbYb`gc`W`Y`J cfZÀ`Y`ZØf`U`Y`6YhY]][ hYb  
Yf\YV`]W`Y`?cbgYei YbnYb`UVYb"

8]Y`FYU`\_h]cb`XYf`6i bXYgdc`]nY]`nY][ hž`k ]Y`k ]W`h][ `gW`bY`Yg  
<UbXY`b`]ghž`i`a`X]Y`G]W`Yf\Y]h]j cb`DUggUbhYb`ni`[ Yk`À\ f`Y]ghYb`"  
9g`]gh`Y]b`\_`UfYf`<]bk Y]g`XUfUi`Zž`XUgg`gc`W`Y`<UbX`i b[ Yb`b]W`h  
c`lbY`?cbgYei YbnYb`V`Y]VYb`i bX`X]Y`6Y\ØfXYb`Ui`W`VY]  
U[ [ fYgg]j Ya`J Yf\U`hYb`YbhgW`cggYb`Y]b[ fY]ZYb`a`ØggYb`"8 Ug  
ØZZYb`h]W`Y`G]W`Yf\Y]hg[ YZØ`\`k ]fX`Xi fW`XYfUfh][ Y`J cfZÀ`Y`]a`a`Yf  
k ]YXYf`Ui`Z`X]Y`DfcVY`[ YghY`hž`k Ug`Y]bYb`k Y]hYfYb`5bfY]n`V]YhYhž  
Df`Aj Ybh]cbga`U`»bU`a`Yb`ni`j`Yfgh`Àf`\_Yb`i bX`G]W`Yf\Y]hg`\_cbnYdhY  
\_cbh]bi ]Yf`]W`ni`ØVYfXYb`\_Yb"

9]b`6`]W`\_`Ui`Z`X]Y`I`fgUW`X`Yb

8]Y`I fgUWX`Yb`ZØf`gc`WX`Yg`J`Yf`U`h`Yb`g]bX`j`J]Y`Z`A`h][`i`bX`c`Zh`  
\_ca`d`YI`"G]Y`fY]WX`Yb`j`cb`d`Yfg`Øb`]WX`Yb`<`Yf`Ui`gZc`fXYfi`b[`Yb`V]g`  
\\b`ni`gcn]U`Yb`Dfc`V`Ya`Yb`"ϑ`j`J]Y`Yb`:`A`Yb`]gh`Y]bY`Zf`Ø`nY]h][`Y`  
ϑ`hY`fj`Yb]cb`Yb`hg`WX`Y]XY`bX`ž`i`a`A`\\b`]WX`Yb`J`cf`Z`A`Y`b`j`cf`ni`VYi`[`Yb`"  
8]Y`:`Yg`Y`g`WX`U`Z`h]gh`[`Y`Zc`fXY`fh`ž`Ui`Za`Yf`\_g`Ua`ni`g`Y]b`i`bX`  
<`]Zg`Ub[`YV`ch`Y`ni`g`WX`U`ZY`b`ž`i`a`A`Yb`g`WX`Yb`]b`\_f]h]g`WX`Yb`  
@YVY`bg`U[`Yb`ni`i`bhY`fgh`Ø`h`nY`b`ž`VY`j`cf`Y`g`ni`9g`\_U`Uh]cb`Yb`\_ca`a`h`"

## F`Y`WX`h`]WX`Y`?`cbg`Ye`i`Y`bn`Y`b`i`bX`a`Ò[`]WX`Y` G`h`f`U`Z`Y`b`

8]Y`J`c`fk`Ø`f`Z`Y`ž`X]Y`[`Y`[`Y`b`X]Y`&`%`A`\\f][`Y`:`f`Ui`Y`f`\\`c`VY`b`k`Y`f`X`Y`b`ž`  
g]bX`i`[`f`Uj`J]Y`f`Y`b`X`i`bX`\_`Ò`b`h`Y`b`ni`Y`f`\\`Y`V`]WX`Yb`f`Y`WX`h`]WX`Yb`  
?`cbg`Ye`i`Y`bn`Y`b`Z`Ø`f`Y`b`"8]Y`5`b`\_`U[`Y`b`k`Y`[`Y`b`8]Y`V`gh`U`\\`g`a`]h`  
K`U`ZY`b`ž`h`A`h`]WX`Ya`5`b`[`f]Z`Z`Ui`Z`J`c`gh`f`Y`W`\_i`b`[`g`V`Y`Ua`h`Y`i`b`X`k`Y`]h`Y`f`Y`f`  
8`Y`\_]`h`Y`\\`U`V`Y`b`]b`8`Y`i`hg`WX`U`b`X`\_`U`f`Y`f`Y`WX`h`]WX`Y`  
F`U`\\`a`Y`b`V`Y`X]b`[`i`b`[`Y`b`"

K`Y`bb`Y]bY`D`Y`fg`cb`V`Y]a`8]Y`V`gh`U`\\`V`Y`k`U`Z`b`Y`h]gh`ž`\_`Ò`b`b`Y`b`X]Y`  
G`h`f`U`Z`Y`b`X`Y`i`h]WX`Y`f`\\`Ò`h`k`Y`f`X`Y`b`"B`U`WX`z`&`(`5`V`g`"%`B`f`"%`X`Y`g`  
G`h`f`U`Z[`Y`g`Y`h`n`V`i`WX`Y`g`f`G`h`6`Ł`k`]f`X`Y]b`8]Y`V`gh`U`\\`ž`X`Y`f`a`]h`Y]b`Y`f`K`U`ZY`  
V`Y[`Ub[`Y`b`k`]f`X`ž`a`]h`Y]b`Y`f`:`f`Y`\\`Y]hg`gh`f`U`Z`Y`j`cb`g`Y`WX`g`A`cb`U`h`Y`b`V]g`  
ni`n`Y`\\`b`ϑ`U`\\`f`Y`b`[`Y`U`\\`b`X`Y`h`"8]Y`k`Y]h`Y`f`Y`5`b`k`Y`b`X`i`b`[`j`cb`zz`%%`  
f`K`]X`Y`f`gh`U`b`X`[`Y`[`Y`b`J`c`gh`f`Y`W`\_i`b`[`g`V`Y`Ua`h`Y`Ł`i`b`X`%` )`  
f`b`Y`Y`X][`i`b`[`Ł`\_`Ò`b`b`h`Y`ni`X`Y`a`ni`k`Y]h`Y`f`Y`b`:`f`Y]`\\`Y]hg`gh`f`U`Z`Y`b`i`b`X`  
;`Y`X`gh`f`U`Z`Y`b`Z`Ø`f`Y`b`ž`k`U`g`]a`:`U`X]Y`g`Y`f`:`f`U`i`ni`Y]b`Y`f`  
a`Y`\\`f`A`\\`f][`Y`b`<`U`Z`gh`f`U`Z`Y`b`Z`Ø`f`Y`b`\_`Ò`b`b`h`Y`ž`U`V`\\`A`b`[`][`j`cb`X`Y`b`  
l`a`g`h`A`b`X`Y`b`i`b`X`X`Y`a`J`c`f`gh`f`U`Z`Y`b`f`Y`[`]gh`Y`f`"

## G`h`U`h]g`h]g`WX`Y`5`b`U`m`g`Y`j`c`b`?`f]a`]b`U`]h`A`h`]b` 6`U`\\`b`\\`Ò`Z`Y`b`

5`\_`hi`Y`Y`G`h`U`h]g`h]\_`Y`b`n`Y][`Y`b`ž`X`U`gg`X]Y`?`f]a`]b`U`]h`A`h`]b`6`U`\\`b`\\`Ò`Z`Y`b`  
k`J]Y`X`Y`a`<`Ui`d`h`V`U`\\`b`\\`c`Z`<`U`Y`f`G`U`U`Y`Ł`]b`X`Y`b`Y`h`h`Y`b`ϑ`U`\\`f`Y`b`Y]b`Y`  
g][`b]Z]\_`Ub`h`Y`<`Y`f`Ui`g`Zc`f`X`Y`fi`b[`Z`Ø`f`X]Y`6`i`b`X`Y`g`d`c`nY]X`U`f`gh`Y`h`  
@`Ui`h`X`Y`a`6`i`b`X`Y`g`\_f]a`]b`U`Ua`h`f`b`?`5`Ł`V`Y]V`h`X]Y`N`U`\\`X`Y`f`  
G`h`f`U`Z`h`Y`b`]b`6`U`\\`b`\\`Ò`Z`Y`b`Y]b`H`\\`Y`a`U`j`cb`Ò`Z`Y`b`h]WX`Ya`ϑ`h`Y`f`Y`gg`Y`ž`

k cVY]8]YVghU\`i bX'? ÒfdYfj Yf`Yhni b[ Yb`X]Y` \Ài Z[ ghYb`8Y`\_hY  
g]bX" ` ð j ]Y`Yb`GhÀXhYb`g]bX`G]WYf\Y]hghYUa`g`i bX`Dc`nY]dfÀgYbn  
YbhgWY]XYbXž`i a`XUg`G]WYf\Y]hg[ YZØ\`XYf` : U\ f[ ÀghY`ni  
ghÀf`\_Yb`"

Ni a`6Y]gd]Y`Yf[ UV`Y]b`6Yf]W`h`XYg`6?5`Ui`g`XYa` ` ð\ f`&\$&ž`XUgg  
Yg]b`XYb`[ fc» Yb`XYi`hgWYb`6U\`b\`ÒZYb`Y]bYb`F`ØW\_[ Ub[ `j`cb` ,  
VY]`XYb` ; YgUa`hghfUZhUhYb`]a` `j`Yf[ `Y]W`ni`a` `j`cf`U\`f`[ UVž  
k`À\`fYbX`g]W`X]Y` : YghbU\`a`Yb`Ui`Z[ fi`bX`j`cb`8]YVghU\`c`XYf  
U[ [ fYgg]j`Ya` `j`Yf\`U`hYb`Y]W`h`Yf\`Ò\`hYb`" `A`U»`bU\`a`Yb`k`jY  
j`YfghÀf`\_hY`j`j`XYc`ØVYfk`UW`i`b[ `i`bX`DfÀgYbn`j`cb  
G]WYf\Y]hg\_`f`À`ZhYb`\`UVYb`g]W`U`g`k`]f`\_gUa` `Yfk`]YgYbž`i`a`X]Y  
G]WYf\Y]h`ZØf`F`Y]gYbXY`ni` `j`YfVYggYfb`" : Øf`k`Y]hYfY  
` ð`Zcfa`Uh]cbYb`ni`f`?`f]a` `]bU`ghUh]gh[\_]b`8Yi`hgW`UbX`VYgi`WYb`G]Y  
V]hY`X]Y`GY]hY`XYg`6?5`"

? i`hi`fY`Yf`?`cb`hYI`h`i`bX`[`YgY`g`W`UZh`]W`Y  
`a`d`\_]`Uh]cbYb`

8]Y`j`cfZ`À`Y`]b`6U\`b\`ÒZYb`g]bX`gma`dhca`Uh]gW`ZØf`VfY]hYfY  
[ YgY`g`W`UZh`]W`Y`DfcV`Ya`Yž`X]Y`gck`c`\`gc`n]U`Y`U`g`Ui`W`  
k`]fhgW`UZh`]W`Y`5gdY`\_hY`i`a`ZUggYb`"8]Y` ; fØbXY`ZØf`U[ [ fYgg]j`Yg  
j`Yf\`U`hYb`i`bX`?`f]a` `]bU`]hÀ`h]g]bX`c`Zi`\_ca`d`YI`i`bX`\_`ÒbbYb`5fa`i`hž  
8fc[ Yba`]ggVfUi`W`c`XYf`dgmW`]gW`Y`DfcV`Ya`Y`i`a`ZUggYb`" ` ð  
8Yi`hgW`UbX`[ ]Vh`Yg`Dfc[ fUa`a`Yž`X]Y`Ui`Z`DfÀ`j`Yb]cb`i`bX  
F`Y\`UV`]hUh]cb`UVn]Y`Ybž`i`a` `b]W`h`bi`f`X]Y`G]WYf\Y]hg`U[ Y`ni  
j`YfVYggYfb`ž`gcbXYfb`Ui`W`X`Yb`VYhfc`ZYbYb`DYfgcbYb`ni` `Y`ZYb`"

8UfØVYf`\]bUi`g`[ ]Vh`Yg`Ub`j`]Y`Yb`6U\`b\`ÒZYb` ` ð]h]Uh]j`Yb`ni`a`  
H\`Ya`U`G]WYf`fY]gYb`ž`VY]`XYbYb`F`Y]gYbXY`ØVYf`]\`fY`F`Y`W`hY  
i`bX`DZ]W`hYb`]bZcfa`]Yfh`k`YfXYb`i`bX`K`]ggYb`ØVYf  
B`chZU`a`U»`bU\`a`Yb`Yf\`U`hYb`"8]YgY`Dfc`Y`\_hY`ZØf`XYfb`Y]b  
6Yk`i`gghgY]b`ZØf`G]WYf\Y]h`i`bX`nY][ Ybž`XUgg`?`f]a` `]bU`]hÀ`h]b  
ÒZYb`h]W`Yb`F`Ài`a`Yb`Y]b`[ Ya`Y]bgUa`Yg`DfcV`Ya` `]ghž`XUg  
\_ccdYfUh]j`Ub[ Y[ Ub[ Yb`k`YfXYb`a`i`gg" `l`a`a`Y\`f`ØVYf`X]Y  
G]WYf\Y]hg]b]h]Uh]j`Yb`ni`YfZU\`fYbž`\_`ÒbbYb`G]Y`X]Y`K`YVgY]hY`XYf  
8Yi`hgW`Yb`6U\`b`VYgi`W`Yb`"

8YhU]g

6Ygi W\Yb`G]Y`i bg`Ui Z.`X]Y!bUW\ f]W\ hYb"bYh