

## J cfZU``]a `G][ a Uf]b[ Yf': fY]VUX. 6UXYa Y]ghYf'gW`À[ h`%&!`À\ f][ Yb

9]b`6UXYa Y]ghYf'gW`À[ h`Y]bYb`nk Ò`Z`À\ f][ Yb`š b[ Yb`]a  
: fY]VUX`G][ a Uf]b[ Yb`"Dc`nY]`Yfa ]hhY`hžJ cfk ØfZY`i bX  
a Ò[ `]WXY`?cbgYei YbnYb`]a : c\_i g"

⇒ : fY]VUX`j cb`G][ a Uf]b[ Yb`\_Ua`Yg`A ]hkh cW`j Yf[ Ub[ YbY  
K cW`Y`ni `Y]bYa `J cfZU``žXYf`X]Y` ; Ya ØhYf`YffY[ h`9]b  
6UXYa Y]ghYf`ghY`h]a `J YfXUW`hž`Y]bYb`nk Ò`Z`À\ f][ Yb`š b[ Yb  
[ YgW`U[ Yb`ni `UVYb`"8]YgY`J cfk ØfZY`k i fXYb`j cb`XYa `?]bX`i bX  
gY]bYf': Ua ]]Y`[ Y`Ài » Yfhž`X]Y`Ui » YfXYa `X]Y`Dc`nY]`]bZcfa ]YfhYbž  
i a `Y]bY`i bhYfgi W`i b[ `Y]bni `Y]hYb`"8Yf`J cfZU``k ]fZi: fU[ Yb`Ui Z  
K ]Y`\_Ubb`Yg`gY]bž`XUgg`Ya UbX`]b`Y]bYf`j YfUb`hk cfhi b[ gj c`Yb  
Dcg]h]cb`gc`UbXY`h3

8Yf`nk Ò`Z`À\ f][ Y`š b[ Yž`XYf`Ub`X]YgYa `HU[ `a ]hgY]bYb': fYi bXYb  
]a : fY]VUX`k Ufž`VYf]W`hYhž`XUgg`Yf`\`Ài Z][ `Xcfh`ni `Z]bXYb`]gh`9f  
[ YghY`hY]bž`XUgg`Yf`]b`XYf`J Yf[ Ub[ Yb`Y]h]a ]hgY]bYb': fYi bXYb  
l bg]bb`[ Ya UW`h`\Uhž`k Ug`VYfY]hg`ni `Y]bYa `Y]bk ÒW`][ Yb  
<Ui gj YfVch`ZØ`fhY`"8]Y`G]hi Uh]cb`Yg`\_U]YfhY`YXcW`ž`U`g`XYf  
6UXYa Y]ghYf`Y]bY`HØf`Ui Zf]gg`i bX`]a `Ui h`5i ggU[ Y`XYg`š b[ Yb  
Ui ZXYb`F ØW`\_Yb`gW`i [ "i A Y]b`F ØW`\_Yb`k Uf`fch žYf`\_`Àfh`XYf  
6YhfcZYbY"

## 8Yf`J cfZU``i bX`X]Y`F YU\_h]cbYb

6Y]`XYa `J cfZU``Ua `A ]hkh cW`h`UhY`XYf`š b[ Y`g]W`]b`XYf  
GUa a Y`\_UV]bY`i a [ Ync[ Ybž`U`g`X]Y` ; fi ddY`a ]hY]bUbXYf  
\Yfi a V`ØXY`h`8Yf`6UXYa Y]ghYf`\`ÀhY`XUfUi Z]b`c`bY  
J cfk Ufbi b[ `X]Y`?UV]bYb`hØf`[ YØZbYhi bX`]b`[ YgW`U[ Yb`"8]Y  
GW`k YghYf`XYg`š b[ Yb`gU`X`Yb`J cfZU``U`g`Ài » Yfgh`VYi bfi \][ YbX

Ub" `B UWk `XYa `HY`YZcbUbf i Z] \fYg`6fi XYfg`Y]`hY`g]Y`gcZcfh`ni` <`>`ZY  
i bX`ZcfXYfhY`9f\_`Àfi b[ Yb`j ca` `6UXYa Y]ghYf" `8Yf`6UXYa Y]ghYfž`gc  
VYf]Wk`hY`h`g]Yž` \ UVY`nk Uf`XYb`J c fZU` ``Y]b[ Yf`Ài a hž`UVYf`g]Wk`b]Wk`h  
Yb`hgWk`i`X][ h" `K ]Ygc`XUfZ`Ya UbX`Xc`fh`UfVY]hYbž`k Ybb`Yf`?`]bXYf  
gWk`À[ h3` ž`ZfU[ h`g]Y`Yb`hgY`hnh"

8]Y`GhUXhk Yf`\_Yž`X]Y`XUg` : fY]VUX`VYhfY]VYbž`Ài » Yfb`VYXUi YfbXž  
XUgg`Y]b`gc`Wk`Yf`J c fZU` ``ghUhh[ YZi bXYb` \ Uh" `@Ui h  
GhUXhk Yf`\_Ygd`fYWk`Yf`DUgWU` `@Ub[ `]gh`XUg`8`cb`Ui` VUX`Y]b  
ZUa` ]Y]b`ZfYi bX`]Wk`Yg`6`UXž`]b`XYa` `; Yk`U`h`\_Y]b`Yb`D`Uhn` \ Uh" `9f  
VYhc`b`hž`XUgg`a` Ub`X]Y`5`fVY]h`XYf`Dc`]nY]`i` bhYfgh`Ø`hn`Yb`k` ]` `i` bX  
XUgg`Y]b`Y`?` `Àfi b[ `XYf`G]hi` Uh]cb`Xf]b[ YbX`b`chk`YbX][ `gY]" `8`Ug  
k`Y]hYfY`5`fVY]hgj`Yf` \ `À`hb]g`XYg`6`UXYa` Y]ghYfg`V`Y]Vh`Y`Xc`Wk`i` b`\_`Ufž  
XU`Y]b`Y`]bhYfb`Y` , VYfd`f`Ø`Zi` b[ `ghUhhZ]bXYb`a` i` gg"

## Dc` ]nY]` ]Wk`Y`9fa` ]hh`i` b[ Yb` ]a` `;` Ub[ Y`

8]Y`9fa` ]hh`i` b[ Yb`XYf`Dc`]nY]`g]bX`VYfY]hg`]a` `;` Ub[ Y"  
Dc`]nY]gd`fYWk`Yf`7` \ f]gh]Ub`Gi` [ [ `VYgh`Àh][ hž`XUgg`X]Y`VYhY]`][ hYb  
DYfgcb`Yb`]b`XYb`\_`ca` a` YbXYb`HU[ Yb`VY`ZfU[ h`k`Yf`XYb`gc` ``Yb" `9g`]gh  
VY`\_`Ub`b`hž`XUgg`]b`XYf`J`Yf[ Ub[ Yb` \ Y]h`ž` [ YbX`]Wk`Y`]a` `;` fY]VUX  
k`]YXYf` \ c`h`b`Y[ Uh]j` `Ui` Z[ YZU` ``Yb`g]bX" `C`V`X]YgY`J`c`f`Z`À` ``Y`]b`Y]b`Ya  
Ni`g`Ua` a` Yb` \ Ub[ `gh`Ub`XYbž`]gh`Y`Xc`Wk` `bc`Wk`i` b`\_`Uf" `8`Ug`?`]bX` \ Uh  
gY]b`Y`G`Wk`k`Y`ghYf`Ø`VYf`XYb`J`c`f`ZU` ``]b`Zc`fa` ]Yf`hž`X]Y`g]Wk` `bi` b`X]Y  
: fU[ Y`ghY` ``hž`k`]Y`XYf`6`UXYa` Y]ghYf`h`f`c`h`n`gc`Wk`Yf`J`c`f`Z`À` ``Y  
k`Y]hYf`Uf`VY]hYb`\_`Ubb"

⊖`XYf`²` ZZYb`h`]Wk`\_Y]h`fY[ h`g]Wk`i` ba` i` h`Ø`VYf`X]Y`G]hi` Uh]cb" `8`Yf  
J`c`f`ZU` `` \ Uh`b]Wk`h`bi`f`X]Y` : Ua` ]Y`XYg`ž` b[ Yb`VY`h`f`c`ZZYbž`gc`b`XYfb  
Ui`Wk`XUg`J`Yf`h`f`Ui`Yb`]b`X]Y`G]Wk`Yf` \ Y]h`]a` `;` fY]VUX`Y`fg`Wk`Ø`h`Y`fh" `9]b`Y  
8]g`\_i` gg]cb`Ø`VYf`X]Y`9][ bi` b[ `j`cb`DYfgcb`U` `]b`gc`Wk`Yb  
9]b`f]Wk`hi` b[ Yb`k`]f`X` ``Ui`h" `K`]f`VYXUi`Yfb`gY` \ fž`XUgg`Yg`ni` `Y]b`Ya  
gc`Wk`Yb`J`c`f`ZU` ``[ Y`\_`ca` a` Yb`]gh`ž`Ài` » Yf`h`g]Wk`XYf  
GhUXhk Yf`\_Ygd`fYWk`Yf`i` bX`Yf` \ `Ø`h`XUa` ]h`XYb`8`fi`W`\_`Ui`Z`X]Y  
J`Yf`Ub`hk`c`fh`]Wk`Yb"

9g`V`Y]Vh`UVni`k`Uf`hYbž`k`]Y`g]Wk`X]Y`G]hi`Uh]cb`Yb`hk`]W`\_`Y`b`k`]f`X"  
K`À` \ fYb`X`X]Y`Dc`]nY]`k`Y]hYf` \ ]b`9fa` ]hh`i` b[ Yb`Ub`ghY` ``hž`Yf`Y`VYb`X]Y

5bk c\bYf'i bX'fY[ Y`a Å» ][ Yb'6UXY[ ÅghY`X]Y`I bG]W\Yf\Y]h'ØVYf  
XYb`I a [ Ub[ `a ]h`J YfUbhk cfh`]W\Yb`ja `: fY]VUX"?" ]bXYf'i bX`XYfYb  
G]W\Yf\Y]h'gc`hYb`ja a Yf`Ub`YfghYf`GhY`Y`ghY`Ybž'i bX`J cfZÅ`Y`k ]Y  
X]YgY`k YfZYb`Y]bYb`GW\UhhYb`Ui ZX]Y`j Yfa`Y]bh`]W`g]W\YfYfY  
I a [ YVi b[ ž`X]Y`gc`W\Y` : fY]nY]hghÅhhYb`V]YhYb`gc`Yb"

K ]f`VYXUi Yfb`gY`fž`XUgg`Yg`ni `Y]bYa`gc`W\Yb`J cfZU`  
[ Y\_ca a Yb`]gh" `8]Y`K cfhY`XYg`GhUXhk Yf`YgdYfW\Yfg  
j YfXYi h`]W\Yb`X]Y`9fbgh`UZh[ `Y]h`XYf`@U[ Yž'i bX`Yg`V`Y]Vh`k ]W\h[ ž  
GWf]hhY`ni `i bhYfbY`a Ybž'i a `XUg`J YfhfUi Yb`XYf`7ca a i b]hm]b  
X]Y`G]W\Yf\Y]hga U» bU`a Yb`k ]YXYf\Yfni ghY`Yb`i bX`gc`W\Y  
J cfZÅ`Y`]b`Ni `i bZ`ni `j Yf\]bXYfb"

## F YU\_h]cbYb`XYf`2 ZZYbh`]W\`\_Y]h`i bX`gcn]U`Y A YX]Yb

8Yf`J cfZU`U`h]b`XYf`2 ZZYbh`]W\`\_Y]h`i bX`]b`gcn]U`Yb`A YX]Yb`Y]bY  
K Y`Y`XYf`9a dØfi b[ `Ui g[ Y`Øgh" J ]Y`Y`Bi hnYf`Ai » Yfb`g]W  
gW`c`\_Y]fh'ØVYf`XUg`J Yf`U`hYb`XYg`6UXYa`Y]ghYfg`i bX`ZcfXYfb  
?cbgYei YbnYb`" `b`j YfgW\]YXYbYb`Cb`]bY!8 ]g\_i gg]cbYb`k YfXYb  
Å\b`]W\Y`9fZU`fi b[ Yb`j cb`UbXYfYb`6UXY[ ÅghYb`[ YhY]`hž`X]Y  
YVYbZU`g`bY[ Uh]j Y`9f`YVb]ggY`a ]h`XYa`DYfgcbU`]b  
GW`k ]a a VÅXYfb`gW`]XYfb`"8 Ug`H`Ya`U` : fYbnØVYfgW`fY]hi b[ `i bX  
X]Y`J YfUbhk cfhi b[ `j cb`5i Zg]W`hgdYfgcbYb`ghY`Yb`ja  
J cfXYf[ fi bX`XYf`8YVUhhYb"

9]b][ Y`Ui ZÅ`][ Y`?ca a YbhUfY`Ui ZD`UhhZcfa Yb`k ]Y` : UWVcc`\_i bX  
Hk ]hhYf`\UVYb`Y]bY`VfY]hYfY`8 ]g\_i gg]cb`ØVYf`X]Y`G]W\Yf\Y]h`i bX  
XYb`GW`i hn`j cb`? ]bXYfb`]b`ØZZYbh`]W\Yb`9]bf]W`hi b[ Yb  
Ub[ Yghc» Yb`"8 Ug`H`Ya`U`Ya`ch]cbU`Yf`A ]ggVfUi W`i bX`d`mg]gW`Y  
; Yk U`h[ Y[ Yb`? ]bXYf`]b`gc`W\Yb`9]bf]W`hi b[ Yb`]gh`b]W`h`bYi ž`k ]fX  
YXcW`Xi fW`X]YgYb`J cfZU`k ]YXYf`]bhYbg]j Yf`VY`Yi W`hYh`"J ]Y`Y  
ZcfXYfb`Y]bY` , VYfdØZ b[ `XYf`G]W\Yf\Y]hga U» bU`a Yb`]b  
: fY]VÅXYfb`i bX`Y]bY`Yb[ YfY`?cbhfc`Y`ØVYf`XUg`DYfgcbU`"

## F YW`hg`U[ Y`i bX`J YfUbhk cfh`]W\`\_Y]h

ϕ'8 Yi hgW\`UbX' [ ]h'Y]bY`fYW\h]W\Y`J YfUbhk cfhi b [ ]j cb  
5i Zg]W\ hgdYfgcbYb`Z0f`X]Y`G]W\Yf\Y]h'XYf'i bhYf']\fYf'5i Zg]W\ h  
ghY\YbXYb`DYfgcbYbž']bgVYgcbXYfY`j cb`A ]bXYf`Ä\][ Yb"8 Ug  
60f[ Yf`]W\Y` ; YgYhnVi W\`f6; 6E'fY[ Y`h]b`z', ' &žXUgg  
5i Zg]W\ hgdZ]W\h][ Y`Z0f`GW\`ÄXYb`\UZhVUf'[ Ya UW\hk YfXYb`\_0bbYbž  
X]Y`Xi fW\`]\fY`5i Zg]W\ hgdZ]W\h] Yf`Yhni b[ `YbhghY\Yb"ä` : U``j cb  
\_0fdYf`]W\Yf`; Yk U`h`\_0bbhY`X]Yg`ni`ghfUZfYW\h]W\Yb  
?cbgYei YbnYb`Z0f`XYb`6UXYa Y]ghYf`Z0\Yb"

Dc`nY]`]W\Y`9fa ]h'i b[ Yb`\_0bbYb`ni gÄhn`]W\Y`fYW\h]W\Y`GW\f]hY  
bUW\`g]W\`n]Y\Ybž']bgVYgcbXYfY`k Ybb`Yg`g]W\`YfUi`gghY`hž`XUgg  
k ]f\_]W\`Y]bY`GhfUZhUh`VY[ Ub[ Yb`k i fXY" `Gc`hY`X]Y  
GhUUhgUb k U`hgW\UZh`5b`\_U[ Y`Yf\YVYbž`\_Ubb`XYf`6UXYa Y]ghYf  
gck c\`ghfUZfYW\h]W\`U`g`Ui W\`n]j ]`fYW\h]W\`ni f`J YfUbhk cfhi b[  
[ Ync[ Yb`k YfXYb"8 ]Yg`\_0bbhY`Ui W\`X]Y`A 0[ `]W\`\_Y]hž']b`XYf  
: fY]nY]h'i bX`GW\k ]a`a`VUXVfUbW\Y`hÄh][`ni`gY]bž`Yf\YV`]W\  
Y]bgW\`fÄb`\_Yb"

K ]W\ h][ \_Y]h`j cb`GW\ i`i`b[ Yb`Z0f  
5i Zg]W\ hgdYfgcbU`

J cfZÄ`Y`k ]Y`X]YgYf`j YfXYi h]W\Yb`X]Y`Bchk YbX][ \_Y]hž`GW\ i`i`b[ Yb  
Z0f`5i Zg]W\ hgdYfgcbU`]b`GW\k ]a`a`VÄXYfb`i bX`UbXYfYb`gcn]U`Yb  
9]b]W\hi b[ Yb`ni`]bhYbg]j ]YfYb" `Dfc[ fUa`a`Yž`X]Y  
8YYg`\_U`Uh]cbghYW\`b]\_Yb`i bX`XYb`i`a` [ Ub[ `a` ]h`gW\k ]Yf][ Yb  
G]hi`Uh]cbYb`Y\`fYbž`g]bX`YggYbn]Y`ž`i`a` `gck c\`X]Y`G]W\Yf\Y]h'XYf  
? ]bXYf`U`g`Ui W\`X]Y`F`YW\hY`XYf`A ]hUfVY]hYf`ni` `gW\`0hnYb" `Gc`W\Y  
GW\ i`i`b[ Yb`\_0bbhYb`XUni`VY]hfU[ Ybž`XUgg`A ]hUfVY]hYf`VYggYf`a` ]h  
?cbZ]\_hYb`i`a` [ Y\Yb`\_0bbYbž`UbghUhh`Ui`Z`U[ [ fYgg]j`Y`A`U»`bU\`a`Yb  
ni`f0W`\_ni [ fY]ZYb"

Ni XYa` `gc`hYb`fY[ Y`a`Ä»][ Y` : cfhV]`Xi b[ Yb`i`bX  
GYbg]V`]g]Yfi b[ ga`U»`bU\`a`Yb`XUni`VY]hfU[ Ybž`XUgg  
5i Zg]W\ hgdYfgcbU`g]W\`]\fYf`J YfUbhk cfhi b[ `VYk`i`ggh`k ]fX`i`bX  
Ub[ Ya`YggYb`\`UbXY`h" `ϕ]h]Uh]j`Ybž`X]Y`Ui`Z`Y]bY`VYggYfY  
?ca`a`i`b]\_Uh]cb`i`bX`?cbZ]\_h`0gi`b[ `Zc`\_i`gg]YfYbž`\_0bbhYb  
`Ub[ Zf]gh][ `XUg`J YfhfUi`Yb`XYf`9`hYfb`i`bX`ž` [ YbX`]W\Yb`]b  
0ZZYb`h]W\Y`6ÄXYf`ghÄf`\_Yb"

8YhU]g

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