

## 6`]b\_Ybg`J Yfa ]hh`i b[ gj Yfgi Wk . K UZZYbfi \Y`]b` ; UnU`Ua `GWk Y]XYk Y[ 3

I G!5i » Yba ]b]ghYf`6`]b\_Yb`XfÅb[ h`Ui ZY]bY`K UZZYbfi \Y`]b` ; UnUž`k Å\ fYbX`?cbZ]\_hY`nk ]gWk Yb`≠gfUY`i bX`XYf`< ]gVc`U\ ni bY`a Yb"

8]Y`GdUbbi b[ Yb`]a `BU\Yb`C ghYb`YffY]Wk Yb`Y]bYb`bYi Yb < Ò\Ydi b\_hž`k Å\ fYbX`i G!5i » Yba ]b]ghYf`5bhcbmi6`]b\_Yb k Y]hYf\]b`]bhYbg]j `Ub`Y]bYf`K UZZYbfi \Y`]b` ; UnU`UfVY]hYh`5\_hi Y`n]Y\hYf`j cb`≠gfUY`bUWk`Y`[ mdhYb`i bX`?UhUfž`i a`X]Y`F ØW`\_Y\ f`ni : f]YXYb`i bX`GhUV]`]hÅh`]b`XYf`F Y[ ]cb`ni `ZØfXYfb`"8]Y`NY]Wk Yb ghY\Yb`YXcWk`Ui Z`Ghi fa ž`XYbb`X]Y` ; YgdfÅWk`Y`gWk Y]bYb`VYfY]hg ]bg`GhcW`Yb`ni `[ YfUhYb`"9]b`6Yf]Wk h`YVh`Yfj cfž`XUgg`Y]b j YfY]bVUfhYg`5V`\_ca`a Yb`a Ò[ `]Wk Yfk Y]gY`c`bY`Y]bY`\_`UfYž i ba ]hhY`VUfY`5`hYfbUh]j Y`Ui g`XYb`5i [ Yb`j Yf`cfYb`k ]fX" K Å\ fYbXXYggYb`Yg\_U`]YfYb`X]Y`?Åa`dZY`Ub`≠gfUY`g`BcfX[ fYbnYž k c`X]Y`]VUbYg]gWk Y`< ]gVc`U\`i bX`X]Y`]gfUY`]gWk Y`@ Zhk UZZY`g]Wk [ Y[ YbgY]h][ `Ub[ fY]ZYb"

6Y]`gY]bYf`5b\_i bZi]b`8c`U`Ai » YfhY`6`]b\_Yb`j cf`XYb j YfgUa`a Y`hYb`æi fbU`]ghYb`X]Y`Xf]b[ YbXY`Bchk YbX][ `Y]hž`Y]bY 9]b][ i b[ `ØVYf`Y]bY`K UZZYbfi \Y`i bX`X]Y` : fY]`Uggi b[ `j cb` ; Y]gY`b ni `Yfn]Y`Yb`" K ]f`a ØggYb`X]Y`j YfY]bVUfi b[ `ØVYf`X]Y`N]Y`"b]Y Vf]b[ Yb`ž`VYhcbhY`Yf`i bX`k ]Yg`Ui Z`X]Y`k UWk gYbXYb`Yb[ ghY \]bg]Wk h`]Wk`XYf`<Ua`Ug! ; Y]gY`b`]\b`"8]Y`\i a`Ub]hÅfY`Bch`U[ Y`]b ; UnU`gY]`YVYbZU`g`U`Ufa`]YfYbXž`k Yg`U`V`U`Y`VYhY]`][ hYb J Yfa ]hhYf`U`Yg`XUfUbgYhnYbž`Y]bY`k Y]hYfY`9g\_U`Uh]cb`ni j Yfa Y]XYb`"i bhYfghØhni b[ `Xi fWk`?UhUf`i bX`Y`[ mdhYb`]gh YbhgWk Y]XYbXž`i a`a ]h`<Ua`Ug`]b`?cbhU`h`ni`hfYhYb`i bX`Y]bY 9]b][ i b[ `YfVY]ni ZØ\ fYb"

< Ua Ug' \_f]h]g]Yfh'I G!B UWX f]WX hYbdc`h]\_

8]Y'FYU\_h]cb'XYf'< Ua Ug'Ui Z'X]Y'Øb[ ghYb'9bhk ]W\_`i b[ Yb'k Uf  
\]b[ Y[ Yb'XYi h]WX'g\_Ydh]gWX'"8]Y'CF[ Ub]gUh]cb'k UfZ'XYb'I G5'j cfž  
g]WX'XYb'6YX]b[ i b[ Yb'XYg' ]gfUY`]gWX'Yb'A ]b]ghYfdFÄg]XYbhYb  
6Yb'Ua ]b'BYhUb'U\i '[ YVYi [ h'ni '\UVYb'i bX'Xfc'h'XUa ]hž'X]Y  
; YgdfÄWX'Y'ni a 'Gh]'`ghUbX'ni 'Vf]b[ Yb"@Ui h'< Ua Ug!GdfYWX'Yf  
CgUa U'<Ua XUb'gc``Yg'bi fi a 'X]Y'I a gYhni b[ 'XYg'D'Ubg'j cb  
DfÄg]XYbh'6]XYb'[ Y\Ybž'XYf'ja 'A U]j cf[ YghY`h'k i fXY'"Nk ]gWX'Yb  
XYb'NY]Yb'k ]fX'XYi h]WX'ž'XUgg'XYf'8fi W\_`Ui Z'6`]b\_Yb'i bX'gY]b  
HYUa 'Ybcfa ' ]ghž'i a ': cfhgWX'f]hhY'ni 'Yfn]Y'Yb'i bX'X]Y  
JYf\UbX'i b[ Yb' ]b'Y]bY'\_cbghfi \_h]j Y'F ]WX'hi b[ 'ni 'Yb\_Yb"

6`]W\_h'ia Ub'Ui ZXUgž'k Ug'VYfY]hg'Ui Z'XYa 'H]gWX'`]Y[ hž'nY][ h'XYf  
j cb'6]XYb'j cf[ YgWX`U[ YbY'D'Ub'Y]bY'XfY]ghi Z][ Y'GhfUHY [ ]Y"  
Ni bÄWX'gh'gc`hY'Y]bY'K UZZYbfi \Y'j cb'gYWX'g'K cWX'Yb'j YfY]bVUfh  
k YfXYbž' ]b'XYf'gck c\`X]Y': fY]'Uggi b[ 'j cb'; Y]gY'b'U'g'Ui WX'j cb  
]b\UZh]YfhYb'DU'Ägh]bYbgYfb'[ YfY[ Y'h'k YfXYb'gc`hYb'"9]bY  
`Ub[ Zf]gh][ Y'9]bghY`i b[ 'XYf': Y]bXgY`][ \_Y]hYb'k ÄfY'XUbb'XYf  
bÄWX'ghY'GWX'f]hž'[ YZc`[ hij cb'Y]bYa 'K ]YXYfUi ZVUi 'XYg  
; UnUghfY]ZYbg' ]b'XYf'YhnhYb'D\UgY'"8]Y'< YfUi gZcfXYfi b[ Yb'XUVY]  
g]bX'YXcWX' i bØVYfgY\VUfž' ]bgVYgcbXYfYž'XU'BYhUb'U\i 'VYhcbh  
\Uhž'XUgg'Yf'b]WX'h'VYfY]h' ]ghž'VYgh]a a hY'ghfUHY [ ]gWX'k ]WX'h][ Y  
; YV]YhY'Ui Zni [ YVYbž'k Ä\ fYbX'X]Y'< Ua Ug'Y]bYb'j c`ghÄbX][ Yb  
FØW\_ni [ 'XYf' ]gfUY`]gWX'Yb'Hfi ddYb'ZcfXYfh"

? cbZ]\_hY'Ub'a Y\ fYfYb': fcbhYb

8Yf'?cbZ]\_h'nk ]gWX'Yb' =gfUY`i bX'XYf'< Ua Ug'\Uh'g]WX' ]bnk ]gWX'Yb  
Ui Za i `h]d`Y': fcbhYb'Ui g[ Yk Y]hYh'"6Y]Y]bYa ' ]gfUY`]gWX'Yb'5b[ f]ZZ  
Ui ZY]b'GWX'i `[ YVÄi XY' ]b'; UnU'\_a 'gc``Y]bY'XYi h]WX'Y'Ni bU\ a Y  
XYf'n]j ]Y'JYf'i ghY'ni 'j YfnY]WX'bYb'[ Yk YgYb'gY]b'"6Yf]WX'hYb  
ni Zc`[ Y'k i fXYb'VY]'X]YgYa '5b[ f]ZZ'nY\ b'A YbgWX'Yb'[ YhØhYh"  
=gfUY'g'5fa YY'VY[ fØbXYhY'XYb '@ ZhUb[ f]ZZ'a ]h'XYa ' < ]bk Y]g'Ui Z  
a ]]hÄf]gWX'Y'5\_h]j ]hÄhYb'XYf'< Ua Ug' ]b'XYa ' ; YVÄi XY"

⇒ XYf'Nk ]gWX'YbnY]h'[ ]Vh'Yg'k Y]hYf\ ]b'U\_h]j Y'?Äa dZY'ja  
; UnUghfY]ZYbž'k cVY]' ]gfUY`]gWX'Y'A ]]hÄfVYf]WX'hY'j cb'nU\`fY]WX'Yb

[ Yh0hYhYb`dU`Àgh]bYbg]gWXYb`?Àa dZYfb`VYf]WXYb`"8]Y`G]hi Uh]cb  
]gh]Ub[ YgdUbbh`i bX`X]Y`A Ò[ `]W\_X]h`k Y]hYfYf`9g\_U`Uh]cb`]b`XYf  
FY[ ]cb`]gh`[ Y[ YVYbž`k Ug`ni gÀhn`]W`VYgcf[ b]gYffY[ YbX`]gh`"B UWX  
XYa`[ Yk U`hgUa Yb`HYffcfUb[ f]ZZ`XYf`< Ua Ug`Ua`"+`"C`\_hcVYf  
ghY][ Yb`X]Y`NU`Yb`XYf`HcXYgcdZYf`gck c`\`Ui Z`dU`Àgh]bYbg]gWXYf  
U`g`Ui W`Ui Z]gfUY`]gWXYf`GY]hY`ghYh][ `Ub"

⊕`Y]bYf`k Y]hYfYb`K YbXi b[ `XYf`9fY][ b]ggY`ZYi YfhYb`Hfi ddYb`XYf  
<]gVc`U`j ca`@]VUbc`b`Ui g`F U`YhYb`Ui Z`gfUY`"8]YgY` ]b`hYbg]j Y  
F U`YhYb!GU`] Y`YfZc`[ h`U`g`5bhk cfh`Ui Z]gfUY`]gWXY`5b[ f]ZY`]b`XYf  
6Y\_UU!9VYbYž`VY`]XYbYb`a Y`fYfY`A YbgWXYb`]Yf`Yhnh`k i fXYb"  
8]Yg`nY][ hž`XUgg`XYf`?cbZ]\_h`b]W`h`bi f`Ui Z`; UnU`VYgW`f`Àb`\_h`]ghž  
gcbXYfb`Ui ZY]bY`[ fÒ»YfY`[ Ycdc`]h]gWXY`5i gY]bUbXYfgYhmi b[  
\]bXYi hYh`gfUY`g`J YfhY]X][ i b[ ga`]b]ghYf`æUj` ; U`Ubh`\_ØbX][ hY  
Ubž`XUgg`g]W`X]Y`C dYfUh]cbYb`bUW`i bX`bUW`j cb` ; UnU`ni f  
bØfX`]WXYb` ; fYbnY`j Yf`U[ Yfb`\_ØbbhYbž`k Ug`X]Y`6YØfW`hi b[ Yb  
ØVYf`Y]bY`VfY]hYfY`a`]h`Af]gWXY`9g\_U`Uh]cb`]b`XYf`FY[ ]cb  
j Yfgh`Àf`\_h"

## 9]bV`]W\_Y`]b`X]Y`G]hi Uh]cb`XYf` ; Y]gY`b

Ni gÀhn`]W`ni f`Ub[ YgdUbbhY`@U[ Y`]gh`X]Y`\i a Ub]h`ÀfY`?f]gY`]b  
 ; UnU`U`Ufa`]YfYbX`"8]Y`]gfUY`]gWXY`5fa YY`[ UV`VY`\_Ubbhž`a Ub  
\UVY`X]Y`@Y]WXYb`]cb`gYW`g`A`ÀbbYfb`[ YVcf[ Ybž`X]Y`]b`XYb  
Hi bbY`b`]cb`7\Ub`ž`b]g]j YfghY`W`h`k UfYb`"5b[ Y`Øf][ Y`g]bX  
Yb`h`Ài gW`hi bX`]Yf`Àf[ Yfh`ØVYf`X]Y`FY[ ]Yfi b[ ž`k Y`]`fY`@]YVghYb  
b]W`h`YVYbX`[ YfY`hY`h`k YfXYb`\_cb`bhYb`"8]Y`< Ua Ug`\`À`h`bi b`bcW  
]a a Yf`%\$-` ; Y]gY`b`]b`]\fYf` ; Yk U`hž`k Ug`X]Y` : cfXYfi b[ `bUW  
Y]bYf`gcZcfh][ Yb`FY[ Y`i b[ `i a gc`Xf]b[ `]WXYf`a UW`h`"8Yf  
C ddcg]h]cbgZØ`fYf`gfUY`gž`š]f`@Ud]Xž`ZcfXYfhY`]b`Y]bYa  
Ya ch]cbU`Yb`5ddY`.` K ]f`a ØggYb`Y]bYb`8YU`a UWXYb`"K ]f  
a ØggYb`"š`hnh"

<]b`hYf[ fi bX]bZcf`a Uh]cbYb`ni f`U`\_hi Y``Yb  
G]hi Uh]cb

8]Y`[ Ycdc`]h]gWXY`@U[ Y`]a`B U`Yb`C ghYb`]gh`gY]h`š`fnY`b`hYb

Ub[ YgdUbbhi bX[ YdfÀ[ hij cb`Y]bYf`J ]Y`nU\`\_ca d`YI Yf`?cbZ]\_hY  
i bX`bhfYfYggYbg\_cbZ]\_hY"8Yf`?cbZ]\_hink ]gWYb`gUY`i bX`XYf  
<Ua Ug`]gh`bi f`Y]b`HY`Y]bYg`j ]Y`[ fÒ» YfYb` ; YgWY\Ybgž`XUg`Ui W  
X]Y`6Yn]Y\i b[ Yb`ni`BUWVUf`ÀbXYfb`k ]Y`ÿ[ mdhYbž`xfXUb]Yb`i bX  
XYb`@]VUbc`i a ZUggh" < ]ghcf]gW` [ YgY\Ybž`\UVYb`g]W`X]YgY  
GdUbbi b[ Yb`]bhYbg] ]YfhgY]h`XYf` ; fØbXi b[ `XYg`GhUUhYg`gUY`]a  
»\f`%- ( , ž`k Ug`ni f`J YfhfY]Vi b[ `Y]bYg`[ fc» Yb`HY]`g`XYf  
dU`Àgh]bYbg]gWYb`6Yj Ò`\_Yfi b[ `ZØ\fhY"8]Y`i bZÀ\][ \_Y]hž`Y]bY  
XUi Yf\UZhY`@Øgi b[ `ni`Z]bXYbž`\Uh]a a Yf`k ]YXYf`ni` ; Yk U`hi bX  
a ]]hÀf]gWYb`5i gY]bUbXYfgYhni b[ Yb`[ YZØ\fh"

8]Y`<Ua Ugž`X]Y`gY]h`&\$+\$`YZZY`\_hj Y`?cbhfc`Y`ØVYf`XYb  
; UnUghfY]ZYb`Ui gØVhž`k ]XYfgYhnhg]W`j Y\Ya Yb`XYa`9]bZi gg  
gUY`g`i bX`g]Y`h`g]W`U`g`J YfhfYhYf]b`XYf`dU`Àgh]bYbg]gWYb  
GUWY"b`XYf` : c`[ Y`g]bX`]a a Yf`k ]YXYf`a ]]hÀf]gWY`?cbZ]\_hYž`k ]Y  
X]Y`Øb[ ghYb`XUfUi Z`Zc`[ YbXYb`FU`YhYbUb[ f]ZZY`i bX`@ ZhUb[ f]ZZYž  
X]Y`5b`hk cfh`Ui Z[ Yk U`hgUa Y`5i gY]bUbXYfgYhni b[ Ybž`X]Y`XUg  
@YVYb`]b`XYf`FY[ ]cb`Yf\YV`]W`VYY]bhfÀW`h][ Yb"8]Y`F`c`Y  
]bhYfbUh]cbU`Yf`5`\_hYi fYž`]bgVYgcbXYfY`XYf`I G5ž`]gh]a  
Ni gUa a Yb\Ub[ `a ]h`XYf`8]d`ca Uh]Y`i bX`XYa`J Yf`gi W`ž`Y]bY  
K UZZYbfi \Y`ni`YffY]WYbž`YVYbZU`g`Ui ggW`U[ [ YVYbX"

## ? YfbghUh]gh]\_Yb`i bX`U`\_hi Y`Y`8 UhYb

I a`X]Y`5i gk ]f`\_i b[ Yb`XYg`U`\_hi Y`Yb`?cbZ]\_hg`VYggYf`ni  
j YfghY\Ybž`g]bX`Y]b][ Y`k ]W`h][ Y`GhUh]gh]\_Yb`j cb`6YXYi hi b[ ``@Ui h  
6Yf]W`hYb`XYf`bUW`XYa` ; UnU!`?cbZ]\_h`U[ ]YfYbXYb  
; Ygi bX\Y]hgVY\ØfXY`XYf`<Ua Ug`]g]bX`gY]h`XYa` +`"C`\_hcVYf`ØVYf  
( \$"%+` `A YbgWYb`]a` ; UnUghfY]ZYb`[ YhØhYh`k cfXYb"8]Yg`k ]fZh`Y]b  
@]W`h`Ui Z`X]Y`\i a Ub]hÀfY`?f]gYž`X]Y`X]Y`6Yj Ò`\_Yfi b[ `XYg  
; UnUghfY]ZYbg`YfXi`XYb`a`i`gg"

5i ZXYf`]gUY`]gWYb`GY]hY`k UfYb`X]Y`i ba ]hY`VUfYb  
5i gk ]f`\_i b[ Yb`Ui W`XfUa Uh]gW`ž`a ]h`fi bX`%"&\$`HchYb`i bX`ØVYf  
&) \$`A YbgWYbž`X]Y`j cb`<Ua Ug!`?Àa dZYfb`]b`XYb` ; UnUghfY]ZYb  
j YfgW`Ydd`h`k`i`fXYb"8]YgY`NU\`Yb`nY][ Yb`X]Y`hfU[ ]gWYb`J Yf`i ghY  
Ui ZVY]XYb`GY]hYb`i bX`j YfXYi h`]WYb`X]Y`8f]b[ `]W`\_Y]hY]bYg  
: f]YXYbgdfcnYggYg"8Yf`J Yf`gi W`j cb`I G!5i » Yba ]b]ghYf`5b`hcbm

6`]b\_YbžY]bY`K UZZYbfi \Y`ni `YffY]WXYb`i bX`ZØf`X]Y` ; Y]gY`b`Y]bY  
@Øgi b[ `ni `Z]bXYbž`ghY`h]b`X]fY`\_hYf`J YfV]bXi b[ `ni `XYf`dFY`\_ÀfYb  
\i a Ub]hÀfYb`@U[ Y"

9]b`5i [ Yba Yf`\_gc``hY`Ui W`Ui ZX]Y`a `]hÀf]gWXYb`5\_h]cbYb`[ Y`Y[ h  
k YfXYb``\_a `U\_hi Y``Yb`?cbZ]\_h`\UVYb`X]Y`]gfUY`]gWXYb`GhfY]h\_fÀZhY  
6Yf]WXYb`ni Zc`[ Y`8i hnYbXY`j cb`@ ZhUb[ f]ZZYb`]a ` ; UnUghfY]ZYb  
[ YZc[ Yb`i bX`Yg`k ]fX`j cb`nU`\fY]WXYb`[ YhØhYhYb`A `]hUbhYb  
[ YgdfcWXYb``9]b`a YX]n]b]gWXYf`6Yf]WXYb`h`XYg``]VUbYg]gWXYb  
; Ygi bX`Y]hga `]b]ghYf]i a g`bUWXYb`YhnhYb`5b[ f]ZZYb`]a `@]VUbc b  
gdf]WXYb`h`j cb`a `]bXYghYbg`bYi b`J Yf`YhnhYb`i bX`a Y`fYfYb`HchYbž  
k Ug`X]Y`F Y[ ]cb`k Y]hYf`XYghUV`]g]YfYb`\_ØbbhY"

8YhU]`g

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