

N]fdh'XUg'K Y]b\À\bWYb']a '7cVi f[ Yf  
@UbX3'A Y`XYb'G]Y'i bg'=\fY': i bXY°

⇒ '7cVi f[ Yf'@UbX'[ ]Vh'Yg'Y]bY'VYa Yf\_Ybgk YfhY  
9bhk ]W\_i b[ . '8Ug'K Y]b\À\bWYbž'Y]bY'a YX]hYffUbY'; f]`Yb!  
5fhž'\Uh'g]W' ]b'X]YgYf'F Y[ ]cb'b]YXYf[ Y`UggYb"'8]YgY'5fh  
dfcZ]h]Yfhj cb'XYb'ni bY\ a YbX'a ]'XYfYb'HYa dYfUhi fYb'i bX  
gcf[ h'ZØf'5i ZgY\Ybž']bgVYgcbXYfY'a ]h'\fYa 'a Uf\_UbhYb  
N]fdYb']b'XYb'5VYbXghi bXYb"'8]Y'@Ui hY'XYg  
K Y]b\À\bWYbg'Yf]bbYfb'Ub'X]Y'\Y]a ]gWYb'; f]`Ybž'XcW  
g]Y'\_ØbbYb'Ui g'Y]bYf'YfghUi b']WYb'8]ghUbn'

⇒ '7cVi f[ Yf'@UbX'[ ]Vh'Yg'Y]bY'VYa Yf\_Ybgk YfhY'9bhk ]W\_i b[ .  
'8Ug'K Y]b\À\bWYbž'Y]bY'a YX]hYffUbY'; f]`Yb!5fhž'\Uh'g]W' ]b  
X]YgYf'F Y[ ]cb'b]YXYf[ Y`UggYb"'8]YgY'5fh'dfcZ]h]Yfhj cb'XYb  
ni bY\ a YbX'a ]'XYfYb'HYa dYfUhi fYb'i bX'gcf[ h'ZØf'5i ZgY\Ybž  
]bgVYgcbXYfY'a ]h'\fYa 'a Uf\_UbhYb'N]fdYb']b'XYb'5VYbXghi bXYb"  
8]Y'@Ui hY'XYg'K Y]b\À\bWYbg'Yf]bbYfb'Ub'X]Y'\Y]a ]gWYb  
; f]`Ybž'XcW'g]Y'\_ØbbYb'Ui g'Y]bYf'YfghUi b']WYb'8]ghUbn'j cb  
ØVYf'%%\$'A YhYfb'\ØfVUf'gY]b"

Jcf'ZØbZ'X\Yb'k i fXY'XUg'K Y]b\À\bWYb'ni a 'YfghYb'A U''a  
'7cVi f[ Yf'@UbX'Xc\_i a Ybh]Yfhž'bUWXYa 'Yg']a 'ž'`]&\$%- 'j cb  
j YfgW]YXYbYb'6YcVUW hYfb']b'XYb'; YV]YhYb'i a 'A YXYf'i bX  
C VYf'Ui hYf[ Y\Øfh'k i fXY"'8Ug'9b[ U[ Ya Ybh'XYg'@6J'7cVi f[ ž'XUg  
X]YgY'6YcVUW hi b[ Yb'Ui ZnY]WbYhž'k i fXY'Xi fW'X]Y'XUa U'] [ Y  
YI d`cg]cbgUfh[ Y 'J YfVfY]hi b[ 'XYf'5fh'Ub[ Yghc» Yb"'8]Y'8UhYb  
k i fXYb'j cb'; Yf\UfX'<ØVbYf'[ YgUa a Y'hž'XYf'bi b'\Ui dhYfi Z]W  
ZØf'XYb'ZUW`]WYb'BUhi fgW i hm'VY]a '@6J'hÅh[ ' ]gh"<ØVbYf']gh  
VYgcf[ h'ØVYf'XYb'FØW\_[ Ub[ 'UbXYfYf'ϕgY\_hYbUfhYbž  
]bgVYgcbXYfY'VY]'GWa YhYf']b[ Ybž'i bX'\YVh'\Yfj c fž'XUgg'hfch  
XYg'Jc`\_gVY[ Y\fYbg'5fhYbj ]Y'ZU'h'X]Y'ϕgY\_hYbVYghÅbXY  
k Y]hYf\]b'UVbY\ a Yb"

# A Y`Xi b[ Yb`ØVYf`K Y]b`À`bWYb`[ Ygi W`h

8Yf`@6J`7cVi f[ `fi Zh`bi b`X]Y`6Yj Ò`\_Yfi b[ `Ui Z`G]W`hi b[ Yb`i bX  
< ÒfdfcVYb`j cb`K Y]b`À`bWYb`ni`a Y`XYb`"8U`X]YgY`; f]`Yb`Yfgh  
VY]`9]bVfi W`XYf`8i b`\_Y`Y]h`U`\_h]`k YfXYb`ž`g]bX`j cf`U`Ya`X]Y  
BUW`hgW`k`Àfa Yf`Ub[ YgdfcW`Yb`" < ØVbYf`Ya`dZ]Y`h`Y]bYb  
GdUn]Yf[ Ub[ `Ui Z`XYb`D]`[ Yfg\Ø[ Y`ž`k`c`a Y`f`U`g`hUi`gYbX  
K Y]b`À`bWYb`[ Y`Øfh`k`YfXYb`\_ØbbYb`"8]YgYf`< Ø[ Y`ž`XYf`Xi`fW  
XYb`6Ui`X`Yg`=79!Hi`bbY`g`Yb`hghUb`XYb`]ghž`V]Yh`Yh`]XYU`Yb  
@YVYbgfUi`a`ZØf`X]Y`; f]`Yb`"

8]Y`5`\_h]j`h`Àh`XYg`K Y]b`À`bWYb`g`Ui`Z`XYa`D]`[ Yfg\Ø[ Y`h`U`h  
VYY]bXfi`W`\_Yb`XY`NU`Yb`Y`Yfj`cf[ YVfUW`h`Gh]W`dfcVYb`\_UVYb  
&\$&\$`Y]bYb`6YghUb`X`j`cb`ZUgh`,`"\$\$\$`f`X]j`]Xi`Yb`Xc`\_i`a`Ybh]Yfh`  
< ØVbYf`\_U`h]b`XYb`Y`hnhYb`\_X`fYb`Ui`W`]a`a`Yf`k`]YXYf  
K Y]b`À`bWYb`]b`XYf`I`a`[ YVi`b[ `XYf`Y`Y`a`U`]Yb`K`YffUVU`b`VY]  
C`VYf`Ui`hYf`[ Y`Øfhž`Y`Xc`W`Z`Y`Yb`V]g`Yf`B`UW`k`Y]gY`Ui`g`XYb  
G]YX`i`b[ gVYfY]W`Yb`"8]YgY`HUhgUW`Y`\_Øbb`h`Y`Y]b`<]bk`Y]g`XUfUi`Z  
gY]b`ž`XUgg`X]Y`k`Ufa`Yb`HYa`dYfUhi`fYb`ž`X]Y`X]Y`J`YfVfY]hi`b[ `XYg  
K Y]b`À`bWYb`g`VY[ Øbgh][ Yb`ž`b]W`h`Ui`gfY]W`Yb`X`g]bX`ž`i`a`]b  
gh`X`h]gW`Yb`; YV]Yh`Yb`Y]bY`Dcdi`U`h]cb`Ui`Zni`VUi`Yb`"

## 8 Ug`5i ggY`Yb`i`bX`< UV]hUh`XYg

### K Y]b`À`bWYb`g

8 Ug`K Y]b`À`bWYb`[ Y`Øfh`ni`f`; Ua`]Y`XYf`@Ub[ ZØ`YfgW`fY`W`\_Yb  
i`bX`YffY]W`h`Y]bY`; fØ»Y`j`cb`Yhk`U`%ž) `NYbh]a`YhYfb`"ÀfY`; ÀfVi`b[  
j`Uf]]Yfh]j`cb`[ Y`V`]W`!VfUi`b`V]g`ghfc`ZUfVYb`ž`i`bX`g]Y`\_UVYb  
`Àb[ YfY`ž`gW`bi`fUfh][ Y`; Ø`Yf`ž`X]Y`]Y`fY`? ÒfdYf`Àb[ Y`ØVYfhfY`ZYb`"  
K Y]VW`Yb`g]bX`]b`XYf`F`Y[ Y`Y`hk`Ug`[ fØ»Yf`U`g`A`ÀbbW`Yb`i`bX  
`UggYb`g]W`Xi`fW`XYb`W`UfU`\_hYf]gh]gW`Yb`ž`[ YVc[ YbYb  
<]bhYf`Y]VgZc`fhgUhn`[ i`hi`bhYfgW`Y]XYb`"

I`fgdfØb[ `]W`]a`A`]hY`a`YYffUi`a`VY`Y]a`UhY`hž`\_U`h]g]W`X`Ug  
K Y]b`À`bWYb`Ui`W`V]g`b`UW`K`YghUg]Yb`Ui`g[ YVfY]h`Yh`f`  
8Yi`hgW`\_Ub`X`fY]W`Yb`X]Y`Dcdi`U`h]cb`Yb`j`cb`6Y`[ ]Yb`ØVYf  
GØXXYi`hgW`\_Ub`X`V]g`]b`X]Y`HgW`YW`gW`Y`F`Y`di`V`\_]`"8]Y`f`gY`\_hYb

VYj cfni [ Yb`hfcW\_YbYž`bÀ\fghcZUfa Y : `ÀWYbž`k ]Y`Yhk U  
HfcW\_YbfUgYb`i bX` : `i [ gUbXXØbYbž`i bX`Z]bXYb`cZha U`g`Y]b  
Ni \Ui gY`]b`i bVYk ]fhgWUZhYhYb`K Y]bVYf[ Yb"

8]Y`FØW\_a Y`Xi b[ Yb`XYf`6Yj Ò`\_Yfi b[ `g]bX`ZØf`X]Y`9fZc fgW i b[  
XYf`J YfVfY]hi b[ `XYg`K Y]b\À\bWYbg`YbhgWY]XYbX"  
HcbUi ZbU\ a Yb`cXYf`[ YbUi Y`GhUbXcfha Y`Xi b[ Yb`g]bX  
Yfk ØbgW hž`i a `A ]ggj YfghÀbXb]ggY`a ]h`UbXYfYb` ; f]`YbUfhYb`ni  
j Yfa Y]XYb`" ðhYfYggYbhYb`\_ØbbYb`]\fY`6YcVUW hi b[ Yb`dYf`9!  
A U]`cXYf`ØVYf`X]Y`hY`YZcb]gWY`<ch]bY`XYg`@6J`7cVi f[  
Y]b fY]WYb`"K Yf`a Y`f`ØVYf`XUg`K Y]b\À\bWYb`YfZU\ fYb`a ÒW hYž  
Z]bXYh`Ui ZXYf`K YVg]hY`XYg`@6J`ni gÀhn`]WY`ðZcfa Uh]cbYb`i bX  
\_Ubb`Ui W`X]Y`WUfU`hYf]gh]gWYb`?`Àb[ Y`XYf` ; f]`Yb`Ub`ØfYb"

## B Uhi fZc fgW Yf`i bX`6Øf[ Yf`]a `9]b gUhn

A ]h`XYa `5i Zfi Zni f`A Y`Xi b[ `j cb`K Y]b\À\bWYb`]bhYfYgg]YfYb  
g]W`bUhØf`]WY` : cfgWYf`b]W`hbi f`ZØf`X]Y`Dcdi `Uh]cb`X]YgYf  
 ; f]`YbUfhž`gcbXYfb`\cZZYb`Ui W`žY]b`i a ZUggYbXYfYg`6]`X`ØVYf`X]Y  
j ]Y`ZÀ`h][ Yb`ðgY`\_hYbVYghÀbXY`]a `7cVi f[ Yf`@UbX`ni `Yf`U`hYb`"8Yf  
5i ghUi gW`nk ]gWYb`B Uhi fgW`ØhnYfb`i bX`5bk c`bYfb`]gh`\]YfVY]  
j cb`[ fc»Yf`6YXYi hi b[ ž`i a `X]Y`J YfÀbXYfi b[ Yb`]b`XYb  
² \_cgmghYa Yb`VYggYf`ni `j YfghY`Yb"

## @YVYbgm\_`i g`i bX` : cfhdZ`Ubni b[ `XYg K Y]b\À\bWYbg

8 Ug`K Y]b\À\bWYb` \UhY]bYb`WUfU`hYf]gh]gWYb`@YVYbgm\_`i gž  
XYf`ghUf`\_a ]h`k Ufa Yb`HYa dYfUhi fYb`i bX`XYf`J YfZØ[ VUf`\_Y]h]j cb  
@YVYbgfÀi a Yb`j YfVi bXYb`]gh`"BUW`XYf` : cfhdZ`Ubni b[ `]a  
GdÀhgca a Yf`Y[ Yb`X]Y`K Y]VWYb`] \fY`9]Yf`]b`k Y]WYfY  
DZ`UbniYbghÀb[ Y`cXYf`X]Y`9fXY`UVž`k c`g]Y`ØVYf`XYb`K ]bhYf`]b  
Y]bYf`Ufj U`Yb`D\UgY`Ui g`UffYb`"8]YgYf`DfcnYgg`nY][ hY]bY  
5bdUggi b[ `Ub`XUg`a YX]hYffUbY`?`]a Už]b`XYa `XUg  
K Y]b\À\bWYb`i fgdfØb[ `]W`VY`Y]a UhYh]gh"

8]Y`@Ufj Yb`gW`ØdZYb`]a ` : fØ`U`f`i bX`Ybhk ]W`Y`b`g]W`gW`bY``ni

UXi`hYb`H]YfYbž`X]Y`UV`ž`b]ni`\\ÖfYb`g]bX"8]YgY`nY]h]WXY  
GmbW fcb]gUh]cb`a`]h`XYf`k`Ufa`Yb`ž\`fYgnY]h]gh`Yb`hgWXY]XYbX`ZÖf  
XUg` , VYf`YVYb`XYf`5fhž`XU`g]Y`Ui`Z`hfc`W`YbYž`c`ZYbY`@YVYbgfÄi`a`Y  
Ub[`Yk`]YgYb`g]bXž`X]Y`g]Y`ni`a`B]ghYb`i`bX` : fYggYb`VYb`Öh][`Yb`"

## 6YXfc`\\i`b[`Yb`i`bX`GWXi`hna`U»`bU`\\a`Yb`

Hfchn`\\fYf`5bdUggi`b[`gZÄ`\\][`\_Y]h]g]Y`h]g]WXY`XUg`K`Y]b`\\Ä`\\bWXYb  
j`YfgWXY]XYbYb`6YXfc`\\i`b[`Yb`[`Y[`Yb`ÖVYfž`X]Y`j`cb`a`YbgWXY`WXYb  
5\_h]j`]hÄhYb`Ui`g[`Y`Yb`" `ž`hYb]g]j`]YfhY`"UbXk`]fhgWXYUZh]WXY  
DfU\_h]\_Ybž`i`fVUb]g]Yfi`b[`i`bX`XYf`J`Yf`i`gh`b`Uh`Öf`]WXYf`<`UV]hUhY  
\\UVYb`XUni`[`Y`ZÖ`\\fhž`XUgg`X]Y`[`YY][`bYhYb`@YVYbgfÄi`a`Y`ZÖf`XUg  
K`Y]b`\\Ä`\\bWXYb`UVbY`\\a`Yb`"8`Uf`ÖVYf`\\]bUi`g`\_`ÖbbYb`WXYa`]gWXY  
DYgh]n]XY`X]Y`ž`gY`\_hY`bdc`di`Uh]cbYb`k`Y]hYf`fYXi`n]YfYbž`k`Ug`g]WXY  
bY[`Uh]j`\_Ui`ZX]Y` : cfhdZUbni`b[`i`bX`XUg` , VYf`YVYb`XYf`5fh  
Ui`gk`]f`\_h`"

I`a`X]YgYb`<`YfUi`gZcfXYfi`b[`Yb`Yb]h[`Y[`Ybni`k`]f`\_Ybž`\\UVYb  
BUhi`fgWXY`hncf[`Ub]gUh]cbYb`k`]Y`XYf`@6J`7cVi`f[`c`\_U`gdYn]Z]gWXY  
A`U»`bU`\\a`Yb`]bg`@YVYb`[`Yfi`ZYbž`i`a`X]Y`@YVYbgfÄi`a`Y`XYg  
K`Y]b`\\Ä`\\bWXYb`g`ni`gWXY`ØhnYb`i`bX`ni`ZÖfXYfb`"8`Uni`[`Y`\\ÖfYb`XUg  
5b`Y[`Yb`j`cb`6`Ø`ghfY]ZYb`i`bX`X]Y`9f`U`hi`b[`i`bVYk`]fhgWXYUZhYhYf  
 : `ÄWXYbž`X]Y`XYb`ž`gY`\_hYb`gck`c`\\`B`U`\\fi`b[`g!`U`g`Ui`WXY  
B]gha`Ö[`]WXY`\_Y]hYb`V]YhYb`"

## 5\_hi`Y`Y` : c`f`g`WXY`i`b[`i`bX`

,`VYfk`UWXY`i`b[`gdfc[`fUa`a`Y`

8]Y`A`cb]hcf]b[`!Dfc[`fUa`a`Yž`k`]Y`g]Y`j`ca`@6J`7cVi`f[  
Xi`fWXY[`Y`ZÖ`\\fh`k`YfXYbž`g]bX`j`cb`Yb`hgWXY]XYbXYf`6YXYi`hi`b[`ž`i`a  
X]Y`J`YfVfY]hi`b[`XYg`K`Y]b`\\Ä`\\bWXYb`g`Ub[`Zf]gh][`ni`VYc`VUWXYhYb`"  
Gc`WXY`8`UhYb`\\Y`ZYb`b]WXY`h`bi`f`XUVY]ž`X]Y`U\_hi`Y`Y`Dc`di`Uh]cb`i`bX  
J`YfVfY]hi`b[`gg]hi`Uh]cb`ni`j`YfghY`\\Ybž`gcbXYfb`Ui`WXY`HfYbXg`ÖVYf  
X]Y`ž\`fY`\\]bk`Y[`ni`Yf`\_Yb`bYb`"8]Y`[`YgUa`a`Y`hYb`ž`Zc`fa`Uh]cbYb  
\_`ÖbbYb`XUni`X]YbYbž`GWXY`hna`U»`bU`\\a`Yb`[`Yn]Y`h`ni`j`YfVYggYfb  
i`bX`XYb`9]bZi`gg`XYg`?`ja`Uk`UbXY`g`Ui`ZX]Y`5fh`ni`Ub`U`mg]YfYb`"

Ni gÀhn`jWk`k YfXYb`fY[ Y`a À» ][ `K cf\_g\cdg`i bX`GW`i `i b[ Yb  
Ub[ YVchYbž`i a `XUg`6Yk`i gghgY]b`XYf`² ZZYbh`jW`\_Y]h`ni `gW`ÀfZYb  
i bX`X]Y`6Yj`Ò`\_Yfi b[ `U`\_hj` `]b`XYb`B`Uhi fgW`i h`n`Y]bni VYn]Y`Yb`"  
8 Ug`9b[ U[ Ya`Ybh`XYf`6Øf[ Yf`]gh`i bYf`Àgg`]W`ž`i a `Y]bY`Z`bX]YfhY  
8 UhYbVUg]g`ni `gW`UZZYb`i bX`X]Y`5fhYbj`]Y`ZU`h`]b`XYf`F`Y[ ]cb`ni  
Yf`U`hYb`"

8YhU]`g

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