

## 9fZc`[ ']b 'XYf'5i gV]`Xi b[ .'6Yfbg'; fi ddY Y\fh'ZØbZ'; YgY``Yb']b'? `Yj Y

8]Y'6Yfbg'; fi ddY'Ui g'? `Yj Y'[ fUhi `]Yfh'bYi Yb'; YgY``Yb'i bX &)!'À\f][ Yb'¾ V]`UfYb'ni ']\fYb'9fZc`[ Yb'i bX'`Ub[ Zf]gh][ Ya 9b[ U[ Ya Ybh"

## 8]Y 6YXYi hi b[ 'j cb '5i gV]`Xi b[ 'VY]'XYf 6Yfbg'; fi ddY

?`Yj Y"'8]Y'6Yfbg'; fi ddY'\Uh'\_Øfn`]W\h'b]W\h'bi f'ZØbZ
5i gni V]`XYbXY'[YY\fhž'X]Y']\fY'DfØZi b[Yb'YfZc`[fY]W\
UV[YgW\`cggYb'\UVYbž'gcbXYfb'Ui W\hk Y]'\$\forall V]`UfY'ZØf']\fY
`Ub['À\f][Y'I bhYfbY\a Ybgni [Y\Of][\_Y]h'[YZY]Yfh"'8]YgY'VY]XYb
9fY][b]ggY'k YfZYb'Y]b'VYgcbXYfYg'@]W\h'Ui Z'X]Y
5i gV]`Xi b[gd\]`cgcd\]Y'XYg'I bhYfbY\a Ybg"

# 9fZc`[fY]W\Y'DfØZi b[Yb'i bX 5i gnY]W\bi b[Yb

±b 'Y]bYf'ZY]Yf`]WX Yb '5 ha cgd\ÀfY'k i fXYb'B]Ua d\Y'Nk]Yf'U`g hYWX b]gWX Y'GmghYa d`UbYf]bž'@Ufg'6]YfVfUi Yf'U`g'9`Y\_hfcb]\_Yf'ZØf 9bYf[]Y!'i bX'; YVÀi XYhYWX b]\_'gck]Y'X]Y'5b`U[Yba YWX Ub]\_Yf ± Ub'K cfcbnck 'i bX'Fcm'GnU``]Yg'Ui g[YnY]WX bYh"'5i WX'8 Ub]Y`@]hUfck]hgWX'Yf\]Y'h'5bYf\_Ybbi b['ZØf'gY]bY'@Y]ghi b['U`g?Ui Za Ubb'ZØf'6Øfca UbU[Ya Ybh"'8]Y'; YgWXÀZhgZØ\fYf'₺Jb'i bX Hca 'J]YfVcca '[fUhi`]YfhYb'XYb'¹ b[Yb': UWX\_fÀZhYb ghY``] YfhfYhYbX'ZØf'XUg'[YgUa hY'HYUa 'XYf'6Yfbg'; fi ddY"

#### @Ub[ 'À\f][ Y 'HfYi Y '\cbcf]Yfh

9]b k Y]hYfYf VYXYi hYbXYf 5gdY\_h XYg I bhYfbY\a Ybg ]gh X]Y K YfhgW\ Ahni b[ \text{ 'Ub}[ \text{ 'A}\f][ Yf A ]hUfVY]hYf" \text{ DY}hYf < Y]ghYf\_Ua dž 6Ui \text{ 'Y]hYbXYf A cbhYi f 'G<? ž i bX '9fWUb '? cn]\_ ž 'A cbhYi f 'G<? ž k i fXYb 'ZØf 'Yk Y] \text{ 'g '\&'} \text{ '\ bY '\ 6Yhf]YVgni [ Y\\ \Of][ \\_Y]h \text{ [ YY\fh" =\ fY \\_cbh]bi ]Yf\]W\ Y '5fVY]h \\ Uh XUni \text{ 'VY}[ YhfU[ Ybž XUgg X]Y '6Yfbg ; fi ddY 'U \text{ 'g '\ ghUV}] \text{ 'Yf '\ DUfhbYf']b '\ nU\ \text{ 'fY}]W\ Yb '\ Dfc 'Y\_hYb' [ ]\ h'' ; YgW\ \AZhgZØ\fYf '\ Hca '\ J ]YfVcca '\ VYhcbhY'\ X]Y '\ 6YXYi hi b[ '\ gc \text{ 'W} Yf \A ]hUfVY]hYf '\ ZØf '\ XYb' I bhYfbY\a YbgYfZc\ [ 'i bX' j Yfg]W\ YfhYž '\ XUgg \|\ fY '\ 9fZU\fi b[ Yb' i bX']\f '\ 9b[ U[ Ya Ybh'i bj Yfn]\ \ \ h\ VUf'\ g]bX''

#### =bj Ygh]h]cb ]b X]Y Ni \_i bZh

8]Y '6Yfbg'; fi ddY '\ Uh'Y]bY'\_`UfY'J]g]cb'ZØf'X]Y'5i gV]`Xi b[''i b[Yf: UWX\_fÀZhYž'j cb'XYf'XUg'I bhYfbY\a Yb'i bX'X]Y'; YgY``gWXUZh dfcZ]h]YfYb'' 8]Y'5i gV]`Xi b['j cb': UWX\_fÀZhYb']gh'Y]bY'=bj Ygh]h]cb]b'X]Y'Ni \_i bZh ž'gU[hY'Hca 'J]YfVcca 'i bX'ZØ[hY'\]bni ž'XUgg'X]Y 6Yfbg'; fi ddY'VYfY]hg'XUg'5i gV]`Xi b[gnYfh]Z]\_Uh'XYf'5[Ybhi f'ZØf 5fVY]h'Yf\U`hYb'\Uh''8]Yg'nY][h'X]Y'\c\Y'Ei U`]hÀh'i bX'XUg 9b[U[Ya Ybhž'a]h'XYa 'XUg'I bhYfbY\a Yb'gY]bY'5i gni V]`XYbXYb VYhfYi h'i bX'Ui Z'X]Y'6Yfi ZgUVgWX`ØggY'j cfVYfY]hYh''

### 5 i gg]WX hY b ZØf ni \_Øb Zh][ Y 5 i gni V] XYb XY

: Øf \*bhYfYgg]YfhY [ ]VhYg bc W '5i gV]`Xi b[ gd`ÀhnYž'X]Y ']a '5i [ i gh
&\$&( 'VY[ ]bbYbž'i bX 'ZØf'&\$&) 'ghY\Yb 'U``Y '5i gV]`Xi b[ gd`ÀhnY 'ni f
J YfZØ[ i b[ "'6YgcbXYfg'bUWX [ YZfU[ h'g]bX'GhY``Yb 'ZØf
5b`U[ Yba YWX Ub]\_Yf#]bbYb']a '6YfY]WX 'GUb]hÀf!ž'<Y]ni b[ g! 'i bX
?`]a UhYWX b]\_'gck ]Y 'ZØf'HYWX b]gWX Y 'GmghYa d`UbYf#]bbYb"'K Yf
g]WX 'ni bÀWX gh'cf]Ybh]YfYb'a ÒWX hYž'\Uh'X]Y'A Ò[ `]WX\_Y]hž'DfU\_h]\_U
ni 'UVgc`j ]YfYbž'i a 'Y]bYb'9]bV`]W\_']b'X]Y'j YfgWX]YXYbYb'6Yfi ZY'ni
Yf\U`hYb"</pre>

### 9]bV`]W\_Y']b'X]Y'5i gV]`Xi b[gd\]`cgcd\]Y

 $8 ]Y `VYgcbXYfYb `6Yn]Y \setminus ib[Ybž'X]Y `nk]gWXYb `5igV]`XYfb `ibX \\ 5i gni V]`XYbXYb `YbhghY \ Ybž'gd]Y[Y`b `g]WX `Ui WX `]b `XYf'? Uff]YfY \\ j cb `GhYZUb `F ØhhYb `k]XYfž'XYf `XYb `HYUa `Y]hYf `XYf' < G!5VhY]`ib[$ 

 $\label{thm:converse} $$V^{XYh'':9f'k:i:fXY'j:cf'%+'*JJ\fYb''j:cb'DYhYf'<Y]ghYf_Ua:d $$Ui:g[YV]^XYh'i:bX'\Uh'g]WX'gY]hXYa:_cbh]bi:]Yf^]WX']a:I:bhYfbY\a:Ybk:Y]hYfYbhk:]W_Y`h'':8]Yg'nY][:h'X]Y'dcg]h]j:Y'9bhk:]W_`i:b[:i:bX'X]Y:?Uff]YfYa:\[O[`]WX_Y]hYb\z^X]Y'Y]bY'5i:gV]^Xi:b[:VY]^XYf'6Yfbg'; fi:ddY:V]YhYb'_Ubb''$ 

#### K Y]hYfY =b Zcfa Uh]cbYb

K Yf'a Y\f'ØVYf'X]Y'?Uff]YfYa Ò[`]WX\_Y]hYb'i bX'X]Y
5i gV]`Xi b[ gd`ÀhnY'YfZU\fYb'a ÒW\hYž'\_Ubb'g]W\'Ui Z'XYf'K YVg]hY
XYf'6Yfbg'; fi ddY'i a gY\Yb.'k k k "VYfbg!
[fi ddY"XY#\_Uff]YfY#, Ui gV]`Xi b['i bX'k k k "VYfbg!
[fi ddY"XY#dfU\_h]\_i a #'

B 5;

8 Y hU]<u>`</u>a

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. 'X]Y!bUWX f]WX hYb "bYh