

## 5a ghYfXUa 'a U`'UbXYfg'Yf`YVYb.'A ]h'XYa <Ui gVcch'X]Y'B]YXYf`UbXY'YfcVYfb

9]bY'GhUXh'a ]h'YI hfYa 'j ]Y': `U]f'i bX'Y]bn][ Ufh][ Ya
7\UfU\_hYf"8Ug']gh'5a ghYfXUa "'A ]h'gY]bYb'j ]Y`Yb'? UbÀ`Yb
i bX'?fUW\hYbž'X]Y'g]W\'Xi fW\'X]Y'GhUXh'n]Y\Ybž'nY]W\bYh
g]W\'X]Y'<Ui dhghUXh'<c``UbXg'Ui g"'8UVY]'V]YhYh'g]Y'bcW\
gY\f'j ]Y``a Y\f' ⊕hYfYggUbhYg'i bX'GY\Ybgk YfhYgžk Ug'Y]bYb
6Ygi W\'cXYf'Ui W\': Yf]YbUi ZYbh\U`h'ni 'Y]bYa '[ Ubn
VYgcbXYfYb'9f`YVb]g'k YfXYb'`UggYb'\_Ubb"'J]Y`Yž'X]Y'XUg
YfghY'A U``XUg'@UbX'i bX'VYgcbXYfg'X]Y'GhUXh'`]YVYb'i bX
gW\AhnYb'[ Y`Yfbh'\UVYbž'k YfXYb'gW\bY``ni
K]YXYf\c`i b[ gh\AhYfb'i bX'\_Y\fYb']a a Yf'k]YXYf'bUW\
5a ghYfXUa 'i bX'<c``UbX'ni fØW\_"'K Yf'Y]ba U``XYb'[ Ubn
VYgcbXYfYb'I f`Ui V'Yf`YVYb'k]``ž'XYf'\_Ubb'Ui W\'j ca 'K UggYf
Ui q'X]Y'GhUXh'YfcVYfb"/ Ua d∧Y``]d/



5a ghYfXUa 'a U`'UbXYfg

9]bY'GhUXh'a ]h'YI hfYa 'j ]Y`: `U]f'i bX'Y]bn][ Ufh][ Ya '7\UfU\_hYf" 8Ug']gh'5a ghYfXUa "'A ]h'gY]bYb'j ]Y`Yb'?UbÀ`Yb'i bX'?fUW\hYbž'X]Y

g]W. Xi fW. X]Y GhUXh n]Y \ Ybž nY]W. bYh g]W. X]Y < Ui dhghUXh < c``UbXg Ui g" 8 UVY] V]YhYh g]Y bc W. gY\f j ]Y `a Y\f \ bhYfYggUbhYg i bX GY\Ybgk YfhYgž k Ug Y]bYb 6 Ygi W. cXYf Ui W. : Yf]YbUi ZYbh\U`h ni Y]bYa [Ubn VYgcbXYfYb 9f`YVb]g k YfXYb `UggYb \_Ubb" J]Y `Yž X]Y XUg YfghY A U``XUg @UbX ii bX VYgcbXYfg X]Y GhUXh `]YVYb ii bX gW. AhnYb [Y`Yfbh \ UVYbž k YfXYb gW. bY``ni K ]YXYf\c`i b[ghÀhYfb ii bX \_Y\fYb ]a a Yf k ]YXYf bUW. 5a ghYfXUa ii bX < c``UbX ni fØW\_" K Yf Y]ba U``XYb [Ubn VYgcbXYfYb I f`Ui V Yf YVYb k ]``ž XYf \_Ubb Ui W. j ca K UggYf Ui g X]Y `GhUXh YfcVYfb "8 Ybb a ]h Y]bYa I f`Ui V `Ui Z XYa < Ui gVcch `Yfbha Ub [Ubn bYi Y DYfgdY\_h]j Yb ii bX A O[`]W. \_Y]hYb \_YbbYb"

## < chY``i bX`FYghUi fUbh`]b`9]bYa</pre>

8]Y:Yf]Yb:Ui ZY]bYa < Ui gVcchYfYVYb:ni '\_ObbYbž']ghYhk Ug [Ubn'VYgcbXYfYg":8Ybb:b]Wk h'bi f'X]Y:5fh'i bX:K Y]gY:gc:gY]bYb I f'Ui V:a ]h'XYb:@]YVghYb:ni 'j YfVf]b[Yb:\UhrgWk:cb:Yhk Ug:gY\f 9]bn][Ufh][Yg:Ub:g]Wk:"5i Wk:XUg:[UbnY:8fi a \Yfi a ']gh'ZØf'X]Y a Y]ghYb:gY\f:Ui ZfY[YbX:i bX:UVYbhYi Yf`]Wk:"6YgcbXYfg:XUbbž k Ybb'a Ub:U`g::Ua ]`]Y:a ]h'?]bXYfb'X]YgY::cfa 'XYg'I f`Ui Vg'k À\`h" <]Yf'\_ca a Yb:U``Y:Ui Z']\fY:?cghYb:i bX:\_ObbYb:g]Wk:ZfY]'i bX i b[Ynk i b[Yb:VYk Y[Yb":<]bni '\_ca a hž'XUgg'a Ub:g]Wk:XUVY] b]Wk h'bUWk:9ggYbgnY]hYb:i bX:7c"'Y]bYg'<chY`g'f]Wk hYb:a i ggž gcbXYfb:j O``]['bUWk:@ gh'i bX:@Ui bY:\UbXY`b'\_Ubb":9ggYb:k Ubb]a a Yf'a Ub:a OWk hY:i bX:Ui Wk:k cfUi Z'a Ub:[YfUXY:5ddYh]h\\Uh"

Ni '6Yhh'[Y\Yb'k Ubb']a a Yf'a Ub'a ÒW\hY'i bX'Ui W\'gcbgh'[]Vh'Yg \_Y]bY'FY[Y\b'Ub'X]Y'a Ub'g]W\'\U\hYb'a i ggž'gcbXYfb'a Ub'\_Ubb g]W\'Y]bZUW\'j Ò``][ '`cg[Y\Ogh'j cb'J YfdZ]W\hi b[Yb'i bX'7c" VYk Y[Yb"I f`Ui VY'Ui Z'XYa '< Ui gVcch``]Y[Yb']a 'HfYbX'i bX YfZfYi Yb'g]W\'k UW\gYbXYf'6Y`]YVh\Y]hž'j ]Y`Y'5bV]YhYfž'k ]Y VY]gd]Y`gk Y]gY'i bhYf\hhdg.#k k k "ZYf]Yb!Ui Z!XYa! k UggYf"XY#\Ui gVcch!a ]YhYb#\c``UbX#Ua ghYfXUa #ni 'Z]bXYbž V]YhYb'ni XYa 'Y]b'gY\f'VfY]hYg'GdY\_hfi a 'Ub'i bhYfgW\]YX`]W\Yb 5b[YVchYb'Ub'< Ui gVcchYb'U`Yf'?`UggYb'i bX'; fO`>Yb'gck]Y 5i qghUhhi b[Yb'Ub"

5a ghYfXUa '?ibghž'<]ghcf]Y'ibX'GW\Òb\Y]h

8 | Y '\ Y ff` | W\ Y ž' b | Y X Y f` À b X | g W\ Y 'G h U X h' | g h' V Y \_ U b b h' ZØf' | \ f Y  $GY \setminus Ybgk \emptyset fX][ Y]hYb'ibX'UiW Z\emptysetf'] \setminus fY'i YYb'?ibghk Yf_Y'ibX$ ? Øbgh`Yfž'k ]Y 'UVYf'Ui W\ 'ZØf']\fY'9]bZ@qqY']b'XYf'?i bgh"'8Ybb'q]Y \_Ubb`Ui W.`U`g`\_Øbgh`Yf]gW\Yg`9fVY`VYnY]W\bYh`k YfXYbž`VY]`XYa  $X]Y'j]Y`Yb'VibhYb'< AigYf'a]h']\fYb'hmd]gWXYb'; ]YVY`ZUggUXYb$  $\hbox{ Ui g"XYa "\%+""} \hbox{$\forall$} \hbox{$f \in XYfh"Y]bY"[fc $\ Y"Fc ``Y"gd]Y`Yb""8cW. }$ Ui WX XYf? Yfb XYf GhUXhž XUg < Yfn XYf B ]YXYf Ub XYž k ]Y i ]Y Y X]YgYb CfhVYnY]W\bYbž]ghY]bn][Ufh][ i bX k i bXYfgW\Ob" 8 Ug ; fUWX hY b gmghYa 'XYf'GhUXh'U``Y]b ']gh'Y]bn][ Ufh][ 'i bX'UVgc`i h  $gY \setminus Ybgk Yfh'' \otimes Ug' J YbYX][ < c``UbXg'ghfU \setminus h' \setminus ]Yf'Xi fW 'gY]bYb$ 7\Ufa Y`i bX`VYgcbXYfg`]b`XYb`Gca a Yfa cbUhYbžk Ybb`X]Y`j ]Y`Yb Ghfu» Y b WUZÅ g '[ Y ZØ``h 'g]b X ž '\ Uh 'X ]Y gY 'GhUX h 'Y ]b '[ Ub n 'V Y gc b X Y f Y g : `U]f" =b di bWhc ?i bgh \_Ubb g]W 5a ghYfXUa 'Ui Z'YXYb : U```gY\Yb `UggYbžXYbb`U``Y]b`XUg`A i gYi a gj ]YfhY``VY\YfVYf[ h`XUg `Y[YbXÀfY'JUb!; c[\!AigYia"'8Ug'F]^\_gaigYia']gh'VYghØW\_h'a]h K Yf\_Yb'| cb'FYa VfUbXh'i bX'JYfa YYf'cXYf'Ui WX'XUg'GhYXY`]^\_ AigYia žXUg ZØfa cXYfbY?ibghghY\hžgc``hYa Ubb]W\h j YfdUggYb" 5`g`UVgc`i hYg`<][\`][\h`YXcW\`VYnY]W\bYb`j ]Y`Y`X]Y FUXhcifyb'XifW\'X]Y'GhUXh'ibX'UVYf'UiW\'X]Y'AÒ[`]W\\_Y]h'X]Y GhUXh'jcb'XYb; fUWXhYb'ibX'?UbÀ`Yb'Uig'ni'VYhfUWXhYb"

## 5a ghYfXUa 'k]Y [YgWXUZZYb ZØf < Ui gVcchi f`Ui VY

8 i fW. X]Y j ]Y Yb; fUW. hYb i bX ? UbA Y i bX X]Y 5 bgW. \@ggY ni GYYb i bX 7 c \ V]Y hY h 5 a ghY fX Ua b U\Yni Y]b 9 \ Xcf UXc Z\ f \ @]YV\UVYf XYf \ Ui gVcchi f`Ui VY \ 8 Ybb \]Yf \_Ubb a Ub g]W. a ]h XYb 6 \ OhW. Yb ZfY] \ Ui ghc VYb i bX X]Y I a [YVi b[ Yf\_i bXYb i bX [Yb]Y \ Yb \ 8]Y j ]Y \ Yb 6 c chY \ Z X]Y j cf XYb HcfYb 5 a ghY fX Ua g Ub\_Yfb \ Z g]b X \ U` Y]b \ gW. cb Y]b \ NY]W. Yb XU \ Z\ f k ]Y \ VY`]YVh X]YgY \ cfa \ XYf \ Yf]Yb \ ]b \ X]YgYa \ \ Yff \ ]W. Yb \ B \ UW. VUf \ Ub X \ ]gh \ 8 Ug cfXYfb \ Y]b Yg \ < Ui gV \ chYg \ \_Ubb \ ØVYfU` \ [Yh\Ah][h i bX X]b[ ZYgh [Ya \ UW. h k YfXYb \ Z XYbb \ X Ug j ]Y \ Z\ A h][ Y \ 5 b[ YVch ]gh fY]W. \ ]W. \ j YfhfYhYb \ ' \ ]bni \ \_ca a h \ Z X Ugg X]Y \ 6 c chY \ gY\fi bhYfgW. ]YX`]W. \ Ui g[ YghUhhYh g]b X i b X Y]b Y A Yb [Y \ Ub 9e i ]da Ybha ]hVf]b [Yb " Gc \_Ubb a Ub VY]a \ 6 i W. Yb [Yb Ui ghYbg \ \_U` i ]YfYb \ Z k ]Y [fc \ XUg \ 6 c chni a \ 9]b Yb \ gY]b \ gc \`i b X \ Z\ Of k \ Y j \ JY` DYfgc b Yb " Ni a

5bXYfYb`UVYf`Ui W\žk]Y`XUg`6cch`Ui gghUZZ]Yfh`gY]b`gc``"`9]bZUW\
i bX`a]h`XYa `B Oh][ ghYb`VYghØW\_hžcXYf`YVYb`Yhk Ug``i I i f]OgYf
i bX`dca dOgYf3`8]Y`DfY]gY`g]bX`XYa YbhgdfYW\YbX`[ YghUZZY`h`i bX
a Ub`\_Ubb`g]W\`XUbb`XUg`dUggYbXY`6cch`Ui ggi W\Yb`i bX`]b`GYY
ghYW\Yb"`8]Y`\_i fnY`9]bZØ\fi b[ `Yf`Ui Vh`Y]b`gW\bY``Yg`9]bZ]bXYb`]b
X]Y`BUj ][ Uh]cb`XYg`6OhW\Ybg`i bX`XUbb`\_Ubb`a Ub`Ui W\`gW\cb`a ]h
XYa `gW\k]a a YbXYb`<chY``ZØf`X]Y`: Ua]`]Y`]b`XYb`k c\`j YfX]YbhYb

H]dd. '8 U'X]YgY'I f`Ui VY']a a Yf'VY`]YVhYf'k YfXYbž'gc``hY'a Ub gW\cb'k Y]h']a 'J cfZY`X'Vi W\Yb"'8]Y'6cchY'g]bX'gc'Ui g[ YghUhhYhž XUgg'a Ub']b'XYf'FY[ Y`'k YXYf'6YhhnYi [ 'i bX'6YnØ[ Y'a ]hVf]b[ Yb a i ggž'bcW\'HcdZ\*DZUbbY\*Z'6YghYW\_'i bX'7c"'9]bn][ 'X]Y I bhYfgW\]YXY']b'XYf'Ødd][ Yb'5i gghUhhi b[ 'i bX'9]bf]W\hi b[ 'gY`Vgh g]bX'j cf\UbXYb'i bX'gd]Y[ Y`b'g]W\'XUbb'Ui W\']b'XYb

8 Y hU]`g

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. 'Y]bY!fY]gY "XY