

## A Ubi '?cbÅ.'K YWXgY`[YfØWXhY'ni '57 A U]`UbX'i bX'a Ò[`]WXY'JYfÀbXYfi b[Yb VY]'; `UXVUWX

A Ubi '?cbå'\_ÒbbhY'6cfi gg]U'A ÒbW\Yb[`UXVUW\'j Yf`UggYb"; ]Vh'Yg'hUhgÀW\`]W\'Y]b'5b[YVch'j cb'57'A U]`UbX'ZØf'XYb A ]hhY`ZY`Xgd]Y`Yf3

8]Y'G]hi Uh]cb'fi bX'i a 'A Ubi '?cbÅ'i bX'6cfi gg]U
A ÒbWXYb[`UXVUWX'gcf[ h'ZØf'5i ZfY[i b[']b'XYf': i » VU``k Y`h''
; YfØWXhY'ØVYf'Y]bYb'a Ò[`]WXYb'K YWXgY`'XYg'&'!'À\f][Yb
A ]hhY`ZY`Xgd]Y`Yfg'hfY]VYb'VYfY]hg'gY]h'Y]b][Yf'NY]h']\f'I bk YgYbž
i bX'X]Y'57'A U]`UbX']gh'XUVY]'gWXY]bVUf'Y]b'\Y]» Yf'5bk ÀfhYf'Ui Z
X]Y'8]YbghY'XYg': fUbncgYb"

± Y]bYa '\_Øfn`]W\'j YfÒZZYbh`]W\hYb'6Yf]W\h'XYf'6]`X'k ]fX
j Yfa Y`XYhž'XUgg'X]Y'57'A]`Ub'Y]b'\_cb\_fYhYg'5b[YVch'ZØf'?cbÅ
i bhYfVfY]hYh'\Uh"'9g'k]fX'j cb'Y]bYf'Gi a a Y'j cb'%\*'A]``]cbYb'9i fc
[YgdfcW\Ybž'X]Y'XYf'HfUX]h]cbg\_`i V'VYfY]h'k ÀfY'ni 'nU\`Yb"'8cW\
X]Y'FYU`]hÀh'g]Y\h'Yhk Ug'UbXYfg'Ui g"

#### I b\_`UfY'J Yf\ Ub X`i b[ Yb'a ]h'A ]`Ub

: `cf]Ub `D`YhhYbVYf[ žY]b `VY\_UbbhYf`HfUbgZYfYI dYfhY 'j cb `G\_mž ghY``h'\_`Ufž`XUgg`Yg`j cb `XYf`57`A ]`Ub `V]g`Ub[ `\_Y]b `cZZ]n]Y``Yg 5b[ YVch`]b `X]YgYf` < O(Y)ZØf`? cbÅ`[ AVY" @Ui h'gY]bYb DZcfa Uh]cbYb 'g]bX`A ]`Ub 'i bX`A O(Y)B \\ Yb[ `UXVUW\ 'V]g\Yf`b]W\hY]ba U``]bg'; Ydf\AW\Y]b[ YhfYhYb" \B ]YgY`K ]XYfgdf\O(Y)K YfZYb : fU[ Yb 'Ui Z'\O(Y)f'X]Y 'b\AW\ghYb 'G\W\f]hhY 'XYg'J YfY]bg"

8]Y'6cfi gg]U'\Uh'\c\Y'9fk Ufhi b[Yb'ZØf'?cbÅž'XYggYb'JYfhfU['V]g &\$&\*'[]`h''8Yf'6i bXYg`][]ghij Yf`Ub[hia]bXYghYbg'&\$'A]``]cbYb

9i fc 'ZØf'XYb'Gd]Y`Yf'i bX'\Uh']b'X]j YfgYb'A YX]YbVYf]W\hYb'gc[Uf j cb'Y]bYf'5V`ÒgYgi a a Y'j cb'&) 'A ]``]cbYb'9i fc'ni nØ[`]W\'Y]bYg YfZc`[gUV\Àb[][Yb'6cbi g'[YgdfcW\Yb"'8]Yg'nY][hž'XUgg'; `UXVUW\b]W\h'[Yk]``h']ghž'?cbÅ'i bhYf'K Yfh'UVni [YVYb'i bX'X]Y JYf\UbX`i b[Yb'Ui ZY]bYb'a Ò[`]W\Yb'HfUbgZYf'[Yn]Y`h'ghYi Yfh"

8 UgʻDchYbn]U`ʻj cbʻ?cbÅʻ]ghʻi bVYghfY]hVUf"ʻ9fʻ]ghʻgY]hʻXfY]ʻ\$J\fYbHY]``XYgʻHYUa gʻi bXʻ\Uhʻ]bʻX]YgYfʻNY]hʻY]bYʻVYY]bXfi W\_YbXY 9bhk ]W\_`i b[ 'Xi fW\`Ui ZYb"'8YbbcW\`V`Y]VhʻX]Yʻ: fU[ YžʻcV XYf K YW\gY``ni 'Y]bYa 'Ui gʻÀbX]gW\Ybʻ?`i VʻgY]bYʻ?Uff]YfYʻZÒfXYfb k ØfXY"'8 U`A ]`UbʻU`gʻY]bYfʻXYfʻVYXYi hYbXghYbʻJ YfY]bYʻ]bʻ9i fcdU [ ]`hžʻ\_ÒbbhY`X]YgʻZØfʻ?cbÅʻXi fW\Ui gʻY]bYʻ[ i hYʻ7\UbWY`XUfghY``Yb"

K Y]hYfY = bhYfYggYbhYb gWXY]bYb YVYbZU``g'Y]b '5i [Y'Ui Z'XYb Gd]Y`Yf'[Yk cfZYb'ni '\UVYb"'BUa Yb'k]Y'DUf]g'GU]bh!; Yfa U]bž BYk WUgh`Y'I b]hYX'i bX'\* j Ybhi g'Hi f]b'k YfXYb']b'XYb'FUi a [Yk cfZYb"'5``YfX]b[g'gWXY]bYb'X]YgY'?`i Vg'U\_hi Y``'bi f'Y]b'`cgYg = bhYfYggY'ni 'nY][Ybž'k Ug'X]Y'G]hi Uh]cb'ZØf'XYb'A]hhY`ZY`Xgd]Y`Yf ni gÀhn`]WX'\_ca d`]n]Yfh'a UWXh"

#### K YW gY`[YfØW hYia kY]hYfY Gd]Y`Yf

5a `FUbXY`X]YgYf`HfUbgZYf[ YfØW\hY`\_ObbhY`Ui W\`Y]b`UbXYfYf Gd]Y`Yf`j cb`6cfi gg]U`A ObW\Yb[`UXVUW\`XYb`JYfY]b`j Yf`UggYb" CgWUf`: fUi `cžY]b`&\$!^A\f][ Yf`8 AbYž`XYf`]b`XYf``YhnhYb`GU]gcb`Ub XYb`: 7`I hfYW\h'j Yf`]Y\Yb`k Ufž`ghY\h'YVYbZU``g`]a `: c\_i g"`9]b K YW\gY``ni a '%"`: GJ`A U]bn`\$) `]gh`]a `; YgdfAW\ž`i bX``Ui h`6]`X \_ObbhY`X]YgYf`HfUbgZYf`VYfY]hg` gc`[ i h`k ]Y`VYgW\`cggYb `gY]b"

: fUi `cž'XYf'YVYbZU``g'Y]bYb'JYfhfU[ 'V]g'&\$&\*']b

A ÒbW\Yb[`UXVUW\`\Uhž'\_ObbhY'Ui Z'@Y]\VUg]g'YfbYi h'X]Y'6cfi gg]U
j Yf`UggYb"'Gc`W\Y'6Yk Y[i b[Yb'nY][Ybž'XUgg'XYf'JYfY]b

a Ò[`]W\Yfk Y]gY'gY]bY'?UXYfghfi \_hi f'ØVYfXYb\_Yb'i bX'j Yf'Øb[Yb

a ÒW\hY"'A]h'XYf'5V[UVY'j cb'Gd]Y`Yfb'\_ObbhY'Y]bY

BYi cf]Ybh]Yfi b[ 'Y]b\Yf[Y\Ybž'X]Y'XYb'K Y[ 'ZØf'hU`Ybh]YfhY

BYi ni [Àb[Y'YVbYb'\_ObbhY'"

 $8\,]Y\,^{1}NY\,]h\,^{1}Xf\dot{A}\,b\,[\,h\dot{z}\,^{2}X\,U\,^{1}X\,Ug\,^{1}HfUbgZY\,fZY\,bghY\,f\,^{1}]a\,\,a\,\,Y\,f\,^{1}b\,\dot{A}\,^{1}Y\,f\,^{1}f@W\underline{\ \ }h^{1}\,^{1}:\,@f$ 

X]Y'JYfY]bgZØ\fi b['j cb'6cfi gg]U'A ÒbW\Yb[`UXVUW\']gh'Yg YbhgW\Y]XYbXž'\_`UfY'9bhgW\Y]Xi b[Yb'ni 'hfYZZYbž'i a 'X]Y JYf\UbX`i b[Yb'j cfUbni hfY]VYb'i bX'a Ò[`]W\Y'BYi ni [Àb[Y'ni]bhY[f]YfYb": Ubg'XYg'?`i Vg'j YfZc`[Yb'[YgdUbbh'X]Y 9bhk]W\_`i b[Ybž']bgVYgcbXYfY']a '<]bV`]W\_'Ui Z'X]Y'Ni \_i bZh'j cb A Ubi '?cbÅ"

8]Y'G]hi Uh]cb'fi bX'i a 'A Ubi '?cbå'i bX'X]Y'6cfi gg]U'k ]fX']b'XYb \_ca a YbXYb'K cWXYb'YbhgWXY]XYbX'gY]b'i bX'\_ÒbbhY k Y]hfY]WXYbXY': c`[Yb'ZØf'XYb'JYfY]b'\UVYb"

8]Y'K YW\gY`[YfØW\hY'i a 'A Ubi '?cbÅ'g]bX'b]W\h'bi f'ZØf'6cfi gg]U A ÒbW\Yb[`UXVUW\'j cb'6YXYi hi b[ ž'gcbXYfb'fYZY\_h]YfYb'Ui W\Y]bY'[fÒ» YfY'9bhk]W\_`i b[']a 'XYi hgW\Yb'i bX'Yi fcdÀ]gW\Yb : i » VU``"'8]Y'HYbXYbnž'\1 b[ Y'HU`YbhY']bg'5i g`UbX'ni hfUbgZYf]YfYbž'\Uh']b'XYb'`YhnhYb'\J\\fYb'ghUf\_'ni [Ybca a Yb"'8]Yg\_Ubb'hY]`k Y]gY'Ui Z'X]Y'Z]bUbn]Y``Y'Gh\Af\_Y'Yb[`]gW\Yf'?`i Vg'i bX'XYf Hcd!?`i Vg'Ui g'XYf'GYf]Y'5'ni fØW\_[YZØ\fh'k YfXYbž'X]Y'VYfY]h'g]bX\Z\\c\Y'5V`ÒgYgi a a Yb'ZØf'j]Y`j YfgdfYW\YbXY'Gd]Y`Yf'ni 'nU\`Yb"

8]Y:i»VU``]bXi ghf]Y'\Uh'g]W\']a 'Ni [Y'XYf'; `cVU`]g]Yfi b[
XfUa Uh]gW\'j YfÀbXYfh"8]Y'XYi hgW\Y'6i bXYg`][U'k Uf'`Ub[Y'NY]h
ZØf']\fY': À\][\_Y]h'VY\_Ubbhž'HU`YbhY'ni 'Ybhk ]W\_Y`bž'X]Y'XUbb
\Ài Z][']bg'5i g`UbX'k YW\gY`bži a ']\fY'?Uff]YfY
k Y]hYfni Ybhk ]W\_Y`b"8Yf'K YW\gY`'j cb'?cbÅ'\_\ObbhY'X]YgYf
9bhk ]W\_`i b['Zc`[YbX'Y]bY'bYi Y'D\UgY'ZØf'6cfi gg]U
A ObW\Yb[`UXVUW\'Y]b`Y]hYbž'X]Y'a O[`]W\Yfk Y]gY'[Ynk i b[Yb']ghž
]\fY'; YgW\AZhgghfUhY[]Y'bYi 'Ui gni f]W\hYbž'i a 'k Y]hYf\]b
k YhhVYk YfVgZÀ\]['ni 'V`Y]VYb"

## 5 i gV`]W\_'Ui Z'X]Y'HfUbgZYfg]hi Uh]cb']b 8 Yi hgWX`UbX'i bX'9 i fcdU

8]Y 5V ÒgYgi a a YbžX]Y ZØf Gd]Y Yf k ]Y ?? cbÅ [ YnU\ `h k YfXYbž g]bX b]W h b i f ZØf X]Y VYhY]`][ hYb J YfY]bY j cb 6Y `Ub[ ž gcbXYfb fYZY\_h]YfYb U i W XYb U``[ Ya Y]bYb HfYbX U i Z XYa HfUbgZYfa Uf\_h" @Ui h Y]bYf 5bU`mgY j cb HfUbgZYfa Uf\_h"XY g]bX X]Y Xi fW gW b]hh`]W Yb 5V ÒgYgi a a Yb ]b XYb ``YhnhYb J\ fYb

\_cbh]bi ]Yf`]WX [ Ygh]Y[ Ybž'k UgʻUi ZʻX]Y BUWX ZfU[ YʻbUWX hU`Ybh]YfhYbʻGd]Y`Yfbʻ\]bk Y]gh"'9]b][ Y'9I dYfhYbʻUf[ i a Ybh]YfYbž XUggʻXYfʻ5bhY]``XYfʻHfUbgZYfUi g[ UVYbʻUbʻXYbʻ; YgUa hY]bbU\a Yb XYfʻ?`i Vgʻ]a a Yfʻa Y\fʻUbghY][ hž'k UgʻX]YʻZ]bUbn]Y``YʻGhUV]`]hÀhʻXYf J YfY]bYʻ[ YZÀ\fXYbʻ\_ObbhY"

8]Y'6i bXYg`][ Uj YfY]bY'a ØggYb'g]W\'bi b'j YfghÀf\_h'Ui Z']\fY
BUW\k i W\gUfVY]h'\_cbnYbhf]YfYbž'i a 'g]W\Yfni ghY``Ybž'XUgg'g]Y
k Y]hYf\]b'Ui Z'Y]bYa '\c\Yb'B]j YUi '\_cb\_i ff]YfYb'\_ObbYb"'8]Y
\$\frac{1}{3}\[YbXU\_UXYa]Yb'j]Y`Yf'7`i Vgž'Y]bgW\`]Y\rightarrow`]W\
A ObW\Yb[`UXVUW\gž'gd]Y`Yb'Y]bY'nYbhfU`Y'Fc``Y'XUVY]ž''\frac{1}{3}\[Y\frac{1}\[Y\frac{1}{3}\[Y\frac{1}{3}\[Y\frac{1}\[Y\frac{1}\[Y\frac{1}\[Y\frac{1}\[Y\frac{1}\[Y\frac{1}\[Y\frac{1}\[Y\frac{1}\[Y\frac{1}

### 9]bgWAhnib[Yb'jcb'9ldYfhYb

9I dYfhYb 'k ]Y 'XYf 'gdcfh`]W\ Y '@Y]hYf 'j cb '6cfi gg]U
A ObW\ Yb[`UXVUW\ ž F c`UbX 'J ]f\_i gž 'VYhcbYb '\ Ai Z][ 'X]Y 'K ]W\ h][ \_Y]h
Y]bYf 'gcf[ ZA`h][ Yb 'HfUbgZYfdc`]h]\_" 'J ]f\_i g`\Uh']b 'XYf

J Yf[ Ub[ Yb\Y]h'Yfk A\ bhž 'XUgg 'Yg'i bUVX]b[ VUf 'gY]ž 'gck c\` 'A b[ Y
Gd]Y `Yf 'nY]hbU\ ']b 'X]Y 'YfghY 'A UbbgW\ UZh 'ni ']bhY[ f]YfYb 'U`g'Ui W\
X]Y 'Z]bUbn]Y ``Y'; Ygi bX\Y]h'XYg'J YfY]bg']a '6`]W\_ 'ni 'VY\U`hYb" '8]Yg
nY][ h'g]W\ 'Ui W\ ']b 'XYf': cfXYfi b[ 'j cb '&) 'A ]``]cbYb '9i fc'd`i g'6cb]
ZØf'? cbA' 'Y]b '6YhfU[ ž'XYf XYb 'Z]bUbn]Y ``Yb '6YXØfZb]ggYb 'XYg
J YfY]bg'Ybhgdf]W\ h'i bX'[ `Y]W\ nY]h][ 'bi hnhž'i a 'dchYbn]Y``Y
HfUbgZYfg'j cb'l bXYfdYfZcfa Yfb']a '? UXYf'ni 'Yfa O`[`]W\ Yb"

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