

# 5 V g W ] Y X 'j c b '5 `U] b '8 Y `c b . 'H f U i Y f Z Y ] Y f U i Z 'g Y ] b Y a '5 b k Y g Y b '] b '8 c i W m

8]Y ZfUbnÒg]gWXY:]`a `Y[YbXY'5`U]b'8Y`cbž'VY\_Ubbh'ZØf'gY]bY a Uf\_UbhYb'Fc``Yb'i bX'gY]bY'WXUf]ga Uh]gWXY'DfÀgYbn'Ui Z'XYf @Y]bk UbXž'\Uh'gY]bY'`YhnhY'Fi \Y'Ui Z'gY]bYa '[YgWXÀhnhYb 5bk YgYb']b'8ci WXmž': fUb\_fY]WXž'[YZI bXYb"'8]Y'HfUi YfZY]Yf'ZUbX]b'Y]bYa 'gY\f'dYfgÒb`]WXYb'FU\a Yb'ghUhhž``YX][`]WX']a '6Y]gY]b j cb'Yb[Yb': fYi bXYb'i bX': Ua ]`]Yž'k]Y'X]Y'BUWXf]WXhYbU[Ybhi f 5: D'VYf]WXhYhY"

5`U]b'8Y`cbž'XYf']a'5`hYf'jcb',,'\\J\fYb'jYfghcfVYb']ghž'\UhhYghYhg'\_`Uf'[YÀi »Yfhž'XUgg'Yf'\_Y]bY'ÒZZYbh`]W\Y'<aa U[Y'cXYf[fc»Y'NYfYacb]Yb'kØbgW\hY"'GY]bY'`YhnhY'6]hhY'kUf'Ygž']b'XYf?UdY``Y'gY]bYg'5bkYgYbgžia[YVYb'jcb'nU\`fY]W\Yb'[Y`]YVhYb<ibXYbž'VY[fUVYb'nikYfXYb"'8]Yg'gd]Y[Y`h'8Y`cbg'KibgW\bUW\Y]bYa'fi\][Yb'ibX']bh]aYb'5VgW\]YX'k]XYf"

# : Ubg'nc ``Yb'F YgdY\_h

6YfY]hg'Y]b][Y'Ghi bXYb'j cf'XYa '6Y[fÀVb]g'j YfgUa a Y`hYb'g]WX nU\`fY]WXY: Ubg'j cf'XYb'HcfYb'gY]bYg'5bk YgYbgž'i a ']\fYf'HfUi Yf 5i gXfi W\_'ni 'j Yf'Y]\Yb"'G]Y''Y[hYb'6`i a Yb'b]YXYf'i bX'hfi [Yb'g]WX ]b'Y]b'?cbXc`YbnVi WX'Y]bž'U`g'NY]WXYb'XYg'FYgdY\_hg'i bX'XYf K YfhgWXÀhni b['ZØf'XYb'j YfghcfVYbYb'GWXUi gd]Y`Yf'''; 'Y]WXnY]h][\]\]Y`hYb'6Yk i bXYfYf'Y]bY'GWXk Y][Ya ]bi hY'UVž']b'XYf'g]Y'ZØf'8Y`cb gUb[Yb"

8]Y'<]b[UVY'X]YgYf: Ubg'XYi hYh'XUfUi Z'\]bž'k]Y'h]YZ'8Y`cb']b'XYf
<YfnYb'nU\`fY]W\Yf'A YbgW\Yb'j YfUb\_Yfh'k Ufž'hfchn'gY]bYg
K i bgW\Yg'bUW\'Ni fØW\_[Ync[Yb\Y]h"'8]YgY'\_`Y]bYž'UVYf'gY\f
VYXYi hYbXY'; YghY'j cb'gc'j ]Y`Yb'A YbgW\Yb'nY][hž'XUgg'XYf
GW\Ui gd]Y`Yf'Y]bYb'VYgcbXYfYb'D`Uhn']a':]`a [YgW\ÀZh'i bX']a
@YVYb'j ]Y`Yf'A YbgW\Yb'\UhhY"

#### 9]b'@YVYb']a 'GWXY]bk YfZYf`]WXh

8 Y`cb'[U`h'U`g'Y]bY'XYf'[fÒ» hYb'=\_cbYb'XYg'ZfUbnÒg]gW\Yb'?]bcg i bX'gd]Y`hY']b'a Y\f'U`g', \$::]`a Yb"'6YgcbXYfg'VY\_Ubbh'k i fXY'Yf Xi fW\'gY]bY'Fc``Y']b' 8 Yf'Y]g\_U`hY'9b[Y` ž'Y]bYa 'K Yf\_'j cb'\*\Ub! D]YffY'A Y`j]``Yž'XUg']\a 'ni 'Y]bYa '`Y[YbXÀfYb'GhUhi g'j Yf\U`Z"8]Y A ]gW\i b['Ui g'7\Uf]ga U'i bX'HU`Ybh']b'gY]bYb'8 UfghY``i b[Yb dfÀ[hY'b]W\h'bi f'X]Y':]`a [YgW\]W\hYž'gcbXYfb'Ui W\'X]Y'?i `hi f'XYg @UbXYg"

GY]b'\_Øbgh`Yf]gW\Yg'9fVY'k]fX'Xi fW\'X]Y'j]Y`Yb'gY\Ybgk YfhYb:]`a Yž']b'XYbYb'Yf'a]h'gd]Y`hYž'kY]hYf`YVYb"'5i W\'k Ybb'5`U]b8Y`cb']a'j Yf[Ub[YbYb'GcbbhU[ž'XYa', , "'@YVYbg'U\fž'j YfghUfVžgc'k]fX'X]Y'9f]bbYfi b['Ub'gY]bY'@Y]ghi b['i bX'gY]b'6Y]hfU['ni fZ]`a]gW\Yb'?i bgh'b]YaU`g'j YfV`UggYb"

#D '9f]bbYfi b[ 'Ub'gY]bY'Ui » Yf[ Yk Ò\b`]WXY'? Uff]YfY'i bX'gY]b
Ui » Yf[ Yk Ò\b`]WXYg'@YVYb'g]bX'X]Y'6Yf]WXhY'ØVYf'gY]bY'`YhnhYb
A ca YbhY'i bX'X]Y'HfUi YfZY]Yf'[ YdfÀ[ h'j cb'@]YVY'i bX
6Yk i bXYfi b[ "'8Y`cb'\]bhYf`Àggh'b]WXh'bi f'Y]bY'J]Y`nU\`'j cb
:]`a Ybž'gcbXYfb'Ui WX'Y]bY'?ca d`YI ]hÀhž'X]Y'g]WX']b'XYf'5fh'i bX
K Y]gY'nY][ hž'k ]Y'Yf'X]Y'K Y`h'gU\'i bX'`YVhY'''GY]b'K i bgWX'bUWX
Y]bYa 'gWX`]WXhYb'5VgWX]YX'\_Ubb'U`g'fYZ'Y\_h]Yfh'Ub[ YgY\Yb
k YfXYb' 'Y]b'k Y]hYfYg'NY]WXYb'gY]bYg'i b\_cbj Ybh]cbY``Yb
@YVYbqqh]`q"

8 Yf'J Yf'i gh'5`U]b'8 Y`cbg'k ]fX'j cb'j ]Y`Yb'U`g'[ fc» Yf'J Yf'i gh'ZØf X]Y': ]`a k Y`h'Ub[ YgY\Ybž'XU'Yf'b]W\h'bi f'Y]b'GW\Ui gd]Y`Yf'k Ufž gcbXYfb'Ui W\'Y]b'`YVYbXYg'GhØW\_: ]`a [ YgW\]W\hYž'XUg']a a Yf']b XYb'9f]bbYfi b[ Yb'XYf'A YbgW\Yb'k Y]hYf`YVYb'k ]fX"

 $\label{eq:condition} 5`U]b`8Y`cbg?Uff]YfY`YfghfYW_h`g]WX`ØVYf`a Y\fYfY`$J\fnY\bhYžibX`gY]b`9]bZigg`UiZ`X]Y`ZfUbnÒg]gWXY`ibX`]bhYfbUh]cbU`Y: ]`a]bXighf]Y`]gh`ibVYghfY]hVUf"`9f`kifXY`%-')`]b`GWYUilž: fUb_fY]WXž`[YVcfYb`ibX`Ybhk]W_Y`hY`g]WX`fUgWX`ni`Y]bYa`XYfVY_UbbhYghYb`; Yg]WXhYf`XYg`YifcdÀ]gWXYb`?]bcg"`$b`XYb`%-*$Yf$J\fYb`kifXY`8Y`cb`a]h:]`aYb`k]Y`8YfY]g_U`hY`9b[Y``ibX8Yf'HcX`XYg`KY]»Yb`DZYfXYg`ni`Y]bYa`]bhYfbUh]cbU`YbGidYfghUf"`8]YgY`Fc``Ybž`X]Y`cZh`jcb`Y]bYf`[fUj]hÀh]gWXYb`ibXaY`UbWXc`]gWXYb`5ifU`[YdfÀ[h`kUfYbž`\U`ZYb`XUVY]ž`gY]b`$aU[YU`g`]_cb]gWXYf`5bh]!<Y`X`ni`ZYgh][Yb"$ 

8 Y`cbg`Ni gUa a YbUfVY]h'a ]h'fYbca a ]YfhYb'FY[]ggYi fYbž XUfi bhYf'@ WX]bc'J]gWcbh]'i bX'A]WXY`Ub[Y`c'5bhcb]cb]ž'hfi [Yb ni f'5bYf\_Ybbi b['gY]bYf'gWXUi gd]Y`Yf]gWXYb': À\][\_Y]hYb'VY]" BYVYb'gY]bYf': ]`a \_Uff]YfY'k Uf'Yf'Ui WX'U`g'DfcXi nYbh'i bX; YgWXAZhga Ubb'hÀh]["'Hfchn'gY]bYg'9fZc`[Yg'k Uf'8Y`cbg'@YVYbUi WX'j cb'?cbhfcj YfgYb'i bX'dYfgÒb`]WXYb'<YfUi gZcfXYfi b[Yb[YdfÀ[hž'XUfi bhYf'gY]bY'cZZYbYb'dc`]h]gWXYb'5bg]WXhYb'i bX'gY]bcZh'hi a i `hfY]WXYg'Df]j Uh`YVYb"'8]YgY': U\_hcfYb'hfi [Yb'XUni 'VY]ž XUgg'Yf'gck c\`'6Yk i bXYfi b['U`g'Ui WX'?f]h]\_'Ui Z'g]WX'nc["

## 9]b 6`]W\_ Ui Z'X]Y Z]`a ]gW Y 9fVY 8 Y`cbg

8]Y::]`a c[fUd\]Y'j cb'5`U]b'8Y`cb'i a ZUggh'?`Ugg]\_Yfž'X]Y'bcW\
\Yi hY'U`g'A U» ghÀVY'XYg'?]bcg'[Y`hYb"BYVYb'VYfY]hg'Yfk À\bhYb
:]`a Yb'[]`h' 8Yf'7`Ub'XYf'G]n]`]UbYf 'U`g'Y]bYf'XYf'<Ò\Ydi b\_hY
gY]bYf'?Uff]YfY"'\dagger X]YgYa ::]`a 'Vf]``]Yfh'8Y`cb']b'XYf'Fc``Y'Y]bYg
]hU`]Yb]gW\Yb'; Ub[ghYfgž'k Ug'gY]b'HU`Ybh'ZØf'\_ca d`YI Y
7\UfU\_hYfY'i bhYf'6Yk Y]g'ghY``h"'9]bY'k Y]hYfY'VYa Yf\_Ybgk YfhY
Ni gUa a YbUfVY]h'k Uf'a ]h'XYa 'FY[]ggYi f'\dagger Yg'8YfUm']b
6cfgU`]bc ž'Y]bYa ; Ub[ghYfZ]`a ž'XYf'X]Y': fYi bXgW\UZh'i bX
@cmU`]hÀh'nk ]gW\Yb'nk Y]'?f]a ]bY``Yb'h\Ya Uh]q]Yfh"

8Y`cbg`Gh]``i bX`gY]bY`8UfghY``i b[`]b`gY]bYb`:]`a Yb`\UVYb`Ui W\Y]bY`[UbnY`; YbYfUh]cb'j cb`GW\Ui gd]Y`Yfb`VYY]bZi ggh"`GY]ba Uf\_UbhYg`5i ggY\Ybž'\_ca V]b]Yfh`a ]h`Y]bYa `]bhYbg]j YbGW\Ui gd]Y`gh]`ž'\Uh`]\b`]a `; YXÀW\hb]g`XYf`Ni gW\Ui Yf'j YfUb\_Yfh'' 8UfØVYf`\]bUi q`k i fXYb`j ]Y`Y`qY]bYf`:]`a Y`]b`fYbca a ]YfhYb

: ]`a ZYgh]j U`g`[YnY][h'i bX`Yf\]Y`hYb`VYXYi hYbXY`5i gnY]W\bi b[Ybž k Ug`gY]bY`GhY``i b[ $^{\cdot}$ ]b`XYf`; YgW\]W\hY`XYg`?]bcg`ZYgh][hY"

## 8]Y HfUi YfZY]Yf i bX XUg 5bXYb\_Yb

8]Y 'HfUi YfZY]Yf 'ZØf '5 `U]b '8 Y `cb 'gd]Y[Y `hY 'gY]bY 'K ØbgWk Y 'i bX DYfgÒb`]Wk\_Y]h'k ]XYf" '8]Y '9bhgWk Y]Xi b[ 'ZØf 'Y]bY 'df]j UhY NYfYa cb]Yž 'ZYfbUV'j cb 'bUh]cbU`Yb '9\fi b[ Ybž']gh'Wk UfU\_hYf]gh]gWk ZØf 'gY]bYb 'ni fØW\_\U`hYbXYb '@YVYbggh]`": Ubgž 'X]Y 'g]Wk 'ni f 6Y]gYhni b[ 'j YfgUa a Y`hYbž 'nY][ hYb 'YXcWk ž 'k ]Y 'ghUf\_'8 Y`cbg 9]bZi gg 'Ui Z'X]Y '2 ZZYbh`]Wk\_Y]h'k Uf" '6`i a Yb 'i bX'; YgWk Yb\_Yž 'X]Y Ua '9]b[ Ub[ 'gY]bYg '5bk YgYbg 'b]YXYf[ Y`Y[ h'k i fXYbž 'VYnYi [ hYb X]Y '8 Ub\_VUf\_Y]h'XYf Ni gWk Ui Yf 'ZØf 'gY]bY '6Y]hfÀ[ Y 'ni ': ]`a 'i bX ?i `hi f"

#D'XYb'gcn]U`Yb'A YX]Yb'k i fXY'gY]b'HcX'k Y`hk Y]h'VYhfUi Yfhži bX j ]Y`Y'Dfca ]bYbhY'i bX': ]`a \_f]h]\_Yf'hY]`hYb']\fY'9f]bbYfi b[ Yb'i bX K ØfX][i b[ Yb''8]YgY'FYU\_h]cbYb'j YfXYi h`]W\hYb'b]W\h'bi f'XYb J Yf`i gh'Y]bYg'[ fc "Yb''GW\Ui gd]Y`Yfgž'gcbXYfb'Ui W\XX]Y'@\W\_Yž'X]Y Yf']b'XYf': ]`a k Y`h'\]bhYf`Aggh'''9g'V`Y]Vh'UVni k UfhYbž'k ]Y'gY]bY: ]`a Y'i bX'gY]b'\_fYUh]j Yg''9fVY']b'XYf'\_ca a YbXYb'; YbYfUh]cb [ Yk ØfX][ h'k YfXYb''

8 Y hU]`q

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z 'b!U[ "XY