

# J YfhfU[gUi Z`Ògi b['VY]'G; '6UfcW\_ghUXh. F]bXYf\_bYW\h']b'XYf'?f]gY

B]Wc'F]bXYf\_bYWkhi]ghifUhicgibUWk'XYfiJYfhfU[gUi Z'Ògi b['VY] XYfiG; '6UfcW\_ghUXh"'9figdf]WkhiØVYfii bYf\_iÀfi]WkY JYfÀbXYfi b[Yb'i bX'XYb'bYi Yb'K Y["

### $B]WcF]bXYf_bYWh. 9]bGd]YYf]aNk]YgdUh$

8]Y 'Øb[ghY'J YfhfU[gUi Z'Ògi b['j cb'B]Wc'F]bXYf\_bYWkh'VY]'XYf'G; 6UfcW\_ghUXh'\Uh'b]Wkh'bi f'XYb'&\*!'À\f][Yb'A]hhY`ZY`Xgd]Y`Yf VYhfcZZYb'[Ya UWkhž'gcbXYfb'k]fZh'Ui Wk'Y]b'@]Wkh'Ui Z'X]Y \_ca d`Yl Y'6Yn]Y\i b['nk]gWkYb'Gd]Y`Yfb'i bX'HfU]bYfb']a ':i » VU``" Gc`WkY'9bhgWkY]Xi b[Yb'\_ObbYb'kY]hfY]WkYbXY'5i gk]f\_i b[Yb'Ui ZX]Y'?Uff]YfY'Y]bYg'Gd]Y`Yfg'i bX'XUg'HYUa '\UVYb''

# 8Yf'JYf'i gh'Y]bYg'@Y]ghi b[ghfÀ[Yfg

F]bXYf\_bYWkhžXYf']b'XYf'j Yf[Ub[YbYb'GU]gcb'bcWk'Y]bYGWk'ZYf\_bYWkhžXYf']b'XYf'j Yf[Ub[YbYb'GU]gcb'bcWk'Y]bYGWk'ZyfY']a 'HYUa 'Y]bbU\a 'i bX'U``Y'Gd]Y`Y'j cb'6Y[]bb'UbUVgc`j ]YfhYž'ghY``h'g]Wk'bi b'X]Y': fU[Y'.K Ufi a '\_\_Ua 'Yg'ni 'X]YgYfd'òhn`]WkYb'K YbXY3' 8]YgY': fU[Y'ghY``Y']Wk'a ]f'YXYb'HU['Ui ZgBYi Y ž'gU[h'Yf'i bX'VYgWkfY]Vh'XUg'; YZØ\``XYf'FUh`cg][\_Y]h''8]Y9bhk ]\w\_`i b['j cb'Y]bYa '[YgWkAhnhYb'Gd]Y`Yf'ni 'Y]bYa JYfhfU[`cgYb']gh'ZØf'j ]Y`Y': i >> VU``dfcZ]g'Y]bY' < YfUi gZcfXYfi b[ž'X]YcZh'gWk Yf'ni 'j YfghY\Yb']ghž'VYgcbXYfg'k Ybb'XYf'Gd]Y`Yf'b]Wkh j Yf`Yhnh']gh'i bX'V]g`Ub['[i hY'@Y]ghi b[Yb'[YnY][h'\Uh'"

A ]ggj YfghÀbXb]ggY nk ]gWXYb HfU]bYf i bXGd]Y`Yf

9]b 'nYbhfu'Yf'Di b\_h']b 'F]bXYf\_bYWk hg'I bj YfghÀbXb]g']gh'X]Y
?ca a i b]\_Uh]cb 'cXYf'j ]Y'a Y\f'XUg': Y\ 'Yb 'XYfgY'VYb"'BUWk 'XYf
K]bhYfdUi gYž'U'g'X]Y'@Y]ghi b[ Yb 'XYg'HYUa g'bUWk']Y» Ybž'k i fXY
F]bXYf\_bYWk h'b]Wk h'a Y\f'VYfØW\_g]Wk h][ h" '9g'`U[ '\_Y]bY
J Yf'Yhni b[ 'j cfž'b]Wk hg ž'gc 'XYf'Gd]Y'Yfž'XYf'X]Y'ZY\ 'YbXY
9f\_`Àfi b[ 'XYf'9bhgWkY]Xi b[ 'VYXUi Yfh"'8Yf'HfU]bYf'GYXUh'; ÒfYb
j Yfk ]Yg'Ui Z'Y]bY'ni 'cZZYbg]j Y'Gd]Y`k Y]gYž'XcWk 'j ]Y'Y'Gd]Y`Yf
Yf'YVYb'À\b`]Wk Y'A ]ggj YfghÀbXb]ggYž'X]Y'ni ': fi ghfUh]cb'ZØ\fYb
\_`ObbYb"' \( \alpha \mathbf{W} \cdot\)UVY'j Yfgi Wk hž'XUg'; YgdfÀWk 'ni 'gi Wk Ybž'UVYf'Yg
k i fXY'UV[ Y'Y\bh ž'\_`U[ h'F]bXYf\_bYWk h"

#### 9]b ZU f f 5 V g W Y h f c h n U Y f K X f [ Y]h Y b

 $\label{thm:gy_byg'Yf[Yfg'ØVYf'X]Y'I a ghÅbXY'nY][h'g]WX'F]bXYf_bYWXhXYf'G; `6UfcW_ghUXh'[Y[YbØVYf'`cmU`" 8Yf'JYfY]b']gh'hcdž'X]YJYfUbhk cfh`]WXYb'gi dYf ž'VYhcbh'XYf'Gd]Y`Yfž'XYf'g]WX']b': i `XUgY\f'k c\`[YZØ\`h'\Uh''8]Y'JYfhfU[gUi Z`Ògi b['gY`Vgh'gY]'ZU]fUV[Y`Ui ZYbž'k Ybb[`Y]WX'g]Y'gWXa Yfn\UZh'ZØf']\b'k Uf'' <math>=$ WX'\ÀhhY[YfbY'bcWX'`Àb[Yf'\]Yf'[Ygd]Y`h ž'gU[h'XYf'; ]Y»YbYfž'XYf'a ]hgY]bYf': Ua ]`]Y']b'XYf'FY[]cb'[`ØW\_`]WX'k Uf''

## 9]b 6`]W\_ ]b X]Y Ni \_i bZh

# FYU\_h]cbYb Ui Z'X]Y J YfhfU[gUi Z'Ògi b[

Ui gʻa Y]bYfʻG]W\hib]W\hiVYggYf žʻVY\_fÀZh][h'Yf"`?`UfʻgW\Y]bhž'XUgg X]Yʻ9bhgW\Y]Xi b[Ybʻ]a ': i » VU``'\_ca d`Ylʻg]bXʻi bXʻj ]Y`Y: U\_hcfYb Y]bYʻFc``Yʻgd]Y`YbžʻgY]'YgʻX]Yʻ@Y]ghi b['Ui ZʻXYa 'D`UhnʻcXYf qhfUhY[]gW\Y`, VYf`Y[i b[Ybʻ]a 'HYUa"

#### : Un]h. 9]b B Yi Ub ZUb [ ]b i bg]WX Y f Y b N Y ]h Y b

8]Y'HfYbbi b['j cb'B]Wc'F]bXYf\_bYWkhi bX'XYf'G; '6UfcW\_ghUXh\_ObbhY'U'g'6Y]gd]Y`'ZØf'X]Y'i bj Yf\cZZhYb'K YbXi b[Yb']a '@YVYbY]bYg': i » VU``gd]Y`Yfg'X]YbYb'''Gc`WkY'9fY][b]ggY'g]bX'b]Wkhibi f gWkk Yf'ZØf'XYb'VYhfcZZYbYb'Gd]Y`Yfž'gcbXYfb'dfÀ[Yb'Ui Wk'X]Y 8mbUa]\_']bbYf\U`V'XYg'HYUag'''K]Y'F]bXYf\_bYWkhik]fX'Yg'bi b YXYa''Gd]Y`Yfž'XYf'j cf'À\b`]WkYb'<YfUi gZcfXYfi b[Yb'ghY\hž[Y`]b[Yb'a ØggYbž'Y]bYb'BYi UbZUb['ni 'k U[Yb'i bX'g]Wk'Ui Z'X]Y\_ca a YbXYb'A O[`]Wk\_Y]hYb'ni '\_cbnYbhf]YfYb''

8 Y hU1`a

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