

N]YgWXUb['ZcfXYfh'A]``]UfXYb'ZØf 6Yj Ò`_Yfi b[ggWXi hn.'K c'g]bX'X]Y ; Y`XYf3

⇒bYba]b]ghYf]b 'HUa UfU'N]YgW\Ub['ZcfXYfh' ⇒j Ygh]h]cbYb ']b
XYb '6Yj Ò`_Yfi b[ggW\i hn 'GUW\gYb!5b\U`hg'Ui g'XYa
⇒ ZfUghfi _hi f!GcbXYfj Yfa Ò[Yb"



GUWX gYb!5b\U`hž'8 Yi hgWX`Ub X`!'8]Y'8]g_i gg]cb'i a

#bj Ygh]h]cbYb']b'XYb'6Yj O`_Yfi b[ggWXi hn'b]a a h': U\fh'Ui Z

#bbYba]b]ghYf]b'HUa UfU'N]YgWXUb['Ui g'GUWXgYb!5b\U`h'\Uh'g]WX
_`Uf'dcg]h]cb]Yfh'i bX'ZcfXYfh'[Yn]Y`hY'Z]bUbn]Y``Y'A]hhY``Ui g'XYa
bYi Yb'#bZfUghfi _hi f!GcbXYfj Yfa O[Ybž'XUg']b'XYb'bAWXghYb

#J\fYb']bg[YgUa h') \$\$'A]``]UfXYb'9i fc'i a ZUggYb'k]fX"'8]Yg
VYf]WXhYh'b!hj "

9]b 'nYbhfU`Yg'5b`]Y[Yb'j cb'N]YgW\Ub[']gh'X]Y ' \pm ghU``Uh]cb'j cb B chghfca U[[fY[UhYb'VY]'6Ui dfc \(Y_hYb\)z']bgVYgcbXYfY'Ub GW\ i `Yb''8]YgY'9]bf]W\ hi b[Yb'gc``Yb'b]W\ h'bi f'XYa

6]`Xi b[gUi ZhfU['X]YbYbž'gcbXYfb']a '9fbghZU```Ui W\'U`g 5b`Ui ZghY``Yb']b'N]j]`!'i bX'? UhUghfcd\Ybg]hi Uh]cbYb'Z b[]YfYb" 8]Y'A]b]ghYf]b'\YVh'\Yfj cfž'XUgg'X]Y'?ca a i bYb']b'GUW\gYb! 5b\U`h'VYfY]hg'Y]bYb'Yf\O\hYb':]bUbnVYXUfZ'g][bU`]g]Yfh'\UVYb i bX'ghfi _hi fY``Y'FØW_ghÀbXY'Ui Z\c`Yb'a ØggYb"

=bj Ygh]h]cbYb]a : c_i g

8 Ugʻ ⇒ ZfUghfi _hi f!GcbXYfj Yfa Ò[Ybʻg]Y\hij cfž'XUggʻ%\$\$ A]``]UfXYb 9i fcʻUbʻX]Yʻ@ÀbXYfʻj YfhY]`hʻk YfXYb"ʻ8]Yʻ6i bXYgfY[]Yfi b[
j YfZc`[hʻa]hʻX]YgYfʻA U» bU\aYʻXUgʻN]Y`ž'X]YʻVYghY\YbXY

→ ZfUghfi _hi fʻni ʻgUb]YfYbʻi bXʻUi gni VUi Ybž'k]YʻX]Y

6i bXYgfY[]Yfi b[ʻYf`Ài hYfh"˙8]YʻA]hhY``_ÒbbYbʻZØfʻY]bYʻJ]Y`nU\`
j cbʻDfcʻY_hYbʻ[Ybi hnh'k YfXYbž'XUfi bhYfʻX]YʻA cXYfb]g]Yfi b[ʻj cb
GWXi `Ybž'X]Yʻ9bhk]W_`i b[ʻXYfʻK Àfa Y! i bXʻ9bYf[]Y]bZfUghfi _hi f
gck]YʻX]YʻG]WXYfghY``i b[ʻXYfʻ: i b_h]cbgZÀ\][_Y]hʻj cb
?fUb_Yb\Ài gYfb"

Nk Y]ZY`gc\bY`\UVYb`X]Y`?ca a i bYb`]b`GUW\gYb!5b\U`h'VY]`XYf
J YfhY]`i b['XYf'; Y`XYf'VYgcbXYfY'5i Za Yf_gUa _Y]h"`N]YgW\Ub[
VYhcbhž'XUgg`[YfUXY`Z]bUbngW\k UW\Y`?ca a i bYb`VY]`XYf
A]hhY`j Yf[UVY`b]W\h'ØVYfgY\Yb`k YfXYb`XØfZYbž'XU'j]Y`Y'j cb
]\bYb`]b`Y]bYf`Ub[YgdUbbhYb`Z]bUbn]Y``Yb`@U[Y`g]bX"`8]YgY
DfcV`Ya Uh]_`]gh`b]W\h'bYi /Y]b`; i hUW\hYb`gc```XU\Yf`X]Y
:]bUbng]hi Uh]cb`XYf`?ca a i bYb`UbU`mg]YfYbž'X]Y`9f[YVb]ggY
Yfk UfhYb`k]f`]a `_ca a YbXYb`\$U\f"

? UfV h ØVY f XY b D Ub ZØf &

 $8]Y'9W_dib_hY'XYg'[Yd`UbhYb'K]fhgWXUZhgd`Ubg'ZØf'&$&)`nY][YbžXUgg'X]Y'FY[]Yfib[`UiWX'VY]'ghfi_hifY``Yb'=bjYgh]h]cbYb'__`UfYDf]cf]hÀhYb'gYhnhž'k]Y'X]Y'8 <math>\Rightarrow$?'VYghÀh][h''8UVY]'ghY\Yb'ibhYfUbXYfYa''%%ž+'A]``]UfXYb'9ifc'ZØf'XYb'JYf_Y\fgVYfY]WX'ibX', žA]``]UfXYb'9ifc'ZØf'X]Y'@AbXYf'ibX'?caaibYb'UiZ'XYf'5[YbXU''KY]hYfY'=bjYgh]h]cbYb'Z]Y*Yb']b'X]Y'8][]hU`]g]Yfib[ž'XYb'5igVUijcb'?fUb_Yb\AigYfb'gck]Y'X]Y'9f\U`hib['jcb'6fØW_Yb'ibXJYf']kXJYffy\fgkY[Yb'']

Ni gàhn`]WX 'gcf[h'Y]bY'[YgYhn`]WX Y'FY[Y`i b['XUZØfž'XUgg'X]Y
@ÀbXYf'YbhgWXY]XYb'_ObbYbž'k]Y'j]Y`'XYf'A]hhY`']b'X]Y
_ca a i bU`Y' \(\delta\) ZfUghfi _hi f'Z]Y» h"'8]YgY': `YI]V]`]hàh'k]fX'U`g
GWX`ØggY``VYhfUWX hYhž'i a 'gdYn]Z]gWX Y'6YXØfZb]ggY'i bX
<YfUi gZcfXYfi b[Yb'j cf'C fh'VYggYf'UXfYgg]YfYb'ni '_ObbYb"
N]YgWX Ub['nY][h'g]WX'cdh]a]gh]gWX ž'XUgg'a]h'XYb'ni gàhn`]WXYb
A]hhY`b'i bX'Y]bYf'j YfVYggYfhYb'5bU`mgY'bUWX\U`h][Y'@Ògi b[Yb
ZØf'X]Y'?ca a i bYb'[YgWX UZZYb'k YfXYb'_ObbYb"

5VgWX`]Y» YbX`k]fX`_`Ufž`XUgg`g]WX`X]Y`6i bXYgdc`]h]_`Ui ZY]bYb
`Ub[Yb`K Y[`XYf`\Dj Ygh]h]cbYb`j cfVYfY]hYh"\8]Y`Bchk YbX][_Y]h
Y]bYf`[i h`Xi fWXXUWXhYb`GhfUhY[]Y`]gh`i bVYghfY]hVUfž`i a `XYb
U_hi Y``Yb`<YfUi gZcfXYfi b[Yb`[YfYWXh`ni `k YfXYb`i bX`X]Y
\DZfUghfi _hi f`ni _i bZhgg]WXYf`ni `[YghU`hYb"`9g`V`Y]Vh`U`gc
gdUbbYbXž`k]Y`X]Y`bÀWXghYb`GWXf]hhY`Ui ggY\Yb`k YfXYb`i bX
k Y`WXY`_cb_fYhYb`A U» bU\a Yb`Ui g`XYa `GcbXYfj Yfa Ò[Yb
i a [YgYhnh`k YfXYb"

8YhU]`g	
Cfh	GUWX gYb!5b\U`hž'8Yi hgWX`UbX
EiY``Yb	• k k k "b!hj "XY
	• k k k "X]_"XY
	• k k k "Vi bXYgfY[]Yfi b["XY

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