

K]fVY``i a ˈ\J\W_gcb =fj]bY. ?cbhfcj YfgYg Hf]_ch gcf[h ZØf 5i ZfY[i b[°

?cbhfcj YfgYb i a ˈ≯JW_gcb ˈ≢j]bYž'? Ud]hÀb 'XYg': 7 'Gh" 'DUi `]ž k Y[Yb 'gY]bYg 'Hf]_chg 'XYg': 7 'DU 'Ygh]bY 'VY]'Y]bYa ': Ygh]j U`" 5bh]gYa]h]ga i g!Jcfk ØfZY 'YbhZUW\h"



Gh'Dui `]ž'8 Yi hgW `Ub X !! *JW_gcb = j]bYž'? Ud]hÀb XYg:: 7 Gh"

DUi `]ž'gcf[h'U_hi Y```ZØf'5i ZfY[i b[i bX \]hn][Y 8]g_i gg]cbYbž

bUW XYa 'Yf'k À\fYbX'gY]bYg'6Ygi Wkg'VY]a 'A i g]_ZYgh]j U`

Df]a Uj YfU'Gci bX ']b Dcfhc Y]b 'Hf]_ch'XYg':: 7 DU`Ygh]bY 'hfi ["

8]YgYg'Gc`]XUf]hÀhg! Dfc Y_hž'XUg'&\$%) ']bg'@YVYb'[Yfi ZYb'k i fXYž
]gh'_Y]b 'c ZZ]n]Y``Yf': i » VU``_`i Vž'gcf[h'YXcW ']b 'gcn]U`Yb'A YX]Yb

ZØf'? cbhfcj YfgYb"'6YgcbXYfg'XUg'8Yg][bž'XUg'Y]bY'gh]`]g]YfhY'NU\`
%%'nY][hž'X]Y'ni XYa 'XUg'[YgUa hY']gfUY`]gWXY'GhUUhg[YV]Yh

i a ZUgghž'\Uh'X]Y'K c[Yb'\cWX[Y\Yb'`UggYb"'a cdc"XY'VYf]WXhYh

ØVYf'X]Y'5bh]gYa]h]ga i g!J cfk ØfZYž'X]Y'[Y[Yb'=j]bY'Yf\cVYb

k YfXYb' 'b]WXh'bi f'j cb'Ui » Ybž'gcbXYfb'Ui WX'j cb'Y][YbYb': Ubg"

8]Y'AY]bi b[Yb'i bhYf'XYb'5b\Àb[Yfb'XYg': 7'Gh"'DUi `]'ZU``Yb'kY]h

9VYbZU``gʻj cbʻ6YXYi hi b[ʻ]gh'X]YʻÒZZYbh`]WXYʻFYU_h]cbʻUi ZʻX]YgY 8YVUhhY"'8YfʻB8FʻVYf]WXhYhYžʻXUggʻX]Yʻ8]g_i gg]cbʻXUfØVYfžʻcV XUgʻHf]_chʻXUgʻ9I]ghYbnfYWXhʻ=gfUY`gʻ]bZfU[YʻghY``hžʻXi fWXʻX]Y 5bg]WXhYbʻXYfʻ: UbgʻUb[Yghc»YbʻK i fXY"'J]Y`YʻZ]bXYbžʻXUggʻX]Y 6chgWXUZhʻXYgʻHf]_chgʻY]bYʻJYf\Ufa `cgi b[ʻXYgʻ<Ua Ug! HYffcf]ga i gʻXUfghY``hžʻK À\fYbXʻUbXYfYʻYgʻU`gʻ\i a Ub]hÀfY I bhYfghØhni b[ʻZØfʻX]YʻdU`Àgh]bYbg]gWXYʻ6Yj Ò`_Yfi b[ʻgY\Yb"'5i Z ±bghU[fUa 'dfÀgYbh]YfhYʻgY]bYʻ: fUi '¾a]``UʻY]bʻ6]`Xʻj cbʻ=fj]bYʻa]h XYa 'Hf]_chʻi bXʻY]bYa '6]Yfʻ]bʻXYfʻ<UbXžʻK UgʻX]Yʻ8YVUhhY ni gÀhn`]WXʻUb\Y]nhYʻV]`X"XY"

9]bY'dc`]h]gW\Y'i bX'a]`]hÀf]gW\Y NY]hYbk YbXY

8]Y'XYfnY]h][Y'@U[Y']a 'BU\Yb'CghYb']gh'VYgcbXYfg'Ub[YgdUbbhžgY]hXYa 'X]Y'<Ua Ug'Ua '+"'C_hcVYf'&\$&' 'Y]bYb'5b[f]ZZ'Ui Z
]gfUY`]gW\Y'CfhgW\UZhYb'j YfØVh'\Uhž'k Ug'ØVYf'%"&\$\$'A YbgW\Yb
XUg'@YVYb'_cghYhY'i bX'a Y\f'U`g'&\$\$'; Y]gY`b'bU\a "'8]YgY
9fY][b]ggY'k i fXYb'j cb'j YfgW\]YXYbYb'UfUV]gW\Yb'A YX]Yb'U`g'Y]b
9fZc`['ZØf'X]Y'UfUV]gW\Y'K Y`h 'VYnY]W\bYhž'k Ug'X]Y'?ca d'YI]hÀh
XYf'G]hi Uh]cb'j YfXYi h']W\h'VdV"XY"'5bh]gYa]h]gW\Y'GhYfYchmdYb
Z]bXYb'g]W\']b'j]Y'Yb'6Yf]W\hYbž'i bX'X]Y'6Yf]W\hYfghUhhi b[']gh
ghUf_'dc'Uf]g]Yfhž'k cVY]'X]Y']gfUY`]gW\Y'5fa YY'cZh'U`g
6YgUhni b[ga UW\h'i bX'X]Y'<Ua Ug'U`g']g`Ua]gW\Yf'K]XYfghUbX
XUf[YghY``h'k]fX"

i bhYfgWX]YX`]WXYb`DYfgdY_h]j Yb`ni `XYb`9fY][b]ggYb`Y]bYb`VfY]hYbFUi a `ZØf`8]g_i gg]cbYb`V]YhYb"`8]Y`6Yf]WXhYfghUhhi b[`Zc_i gg]Yfhg]WX`Ui Z`a]`]hÀf]gWXY`9bhk]W_`i b[Yb`i bX`hYff]hcf]U`Y`5bgdfØWXYžkÀ\fYbX`5bh]gYa]h]ga i g`\Ài Z][`k Yb][Yf`6YUWXhi b[`Z]bXYhž`k YbbX]Y`UfUV]gWXYb`AYX]Yb`ØVYf`XYb`?cbZ]_h`VYf]WXhYb"; `Y]WXnY]h][VYn]Y\Yb`g]WX`X]Y`8YVUhhYb`ØVYf`XYb`BU\cgh!?cbZ`]_h`cZh`Ui Z]XYc`c[]gWXYi bX`fY`][]ÒgY`5i gY]bUbXYfgYhni b[Ybž`k Ug`X]Y ?ca d`Yl]hÀh`XYf`8]g_i gg]cb`k Y]hYf`Yf\Ò\h"

K Ug bi b ZØf >UW_gcb =fj]bY3

 $5_hi\ Y```V`Y]Vh`UVni\ k\ UfhYbž'k\]Y`g]Wk`X]Y`G]hi\ Uh]cb`ZØf`*JW_gcb \\ =fj\]bY`ibX`XYb`: 7`Gh'`DUi`]ik Y]hYfYbhk]W_Y`b`k]fX"`8Yf? Ud]hÅb \Uh`V]g`Ub[``_Y]b`cZZ]n]Y``Yg`GhUhYa Ybh`ni `XYb`Jcfk ØfZYb UV[Y[YVYbž'ibX`Yg`V`Y]Vh`ib_`Ufž`cV`Yf`g]Wk`]b`Ni_ibZh`ÔZZYbh`]Wk ni `gY]bYb`6Yk Y[[fØbXYb`Ài <math>\rangle$ Yfb`k]fX"` \Rightarrow Y]bYf`NY]hž']b`XYf gdcfh`]WkY:][ifYb`ibX`]\fY`Gma Vc`Y`Y]bY`[fc \rangle Y`6YXYihib[VYg]hnYbž'gWkY]bh`X]Y`JYfUbhk cfhib[ž`X]Y`a]h`gc`WkYb`GhUhYaYbhgY]b\Yf[Y\hž'aY\f`XYbb`Y`fY`YjUbh`ni `gY]b"`8]Y`8YVUhhY`ia`XUg Hf]_ch`ibX`X]Y`XU\]bhYfghY\YbXY`dc`]h]gWkY`8]aYbg]cb`gd]Y[Y`h X]Y`<YfUigZcfXYfib[Yb`k]XYfž'a]h`XYbYb`b]Wkh'bif :i \rangle VU``jYfY]bYž'gcbXYfb`UiWk`; YgY``gWkUZhYb`]a`5``[YaY]bYb_cbZfcbh]Yfh`q]bX"

8 Y hU]`g	
Cfh	Gh'DUi`]ž'8 Yi hgWX`Ub X
Ei Y``Yb	• k k k "a cdc"XY
	• k k k "V]`X"XY
	• k k k "VdV"XY

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z 'X]Y!bUWX f]WX hYb "Wca