

$7 \]bU'[fØbXYh'bUh]cbU`Y'6`cW_WXU]b!$ Cf[Ub]gUh]cb'fbYf]WX hŁ

6Yf]WXhYb ni Zc`[Y\UhXUg'WX]bYg]gWXY'A]b]ghYf]i a ZØf K]ggYbgW\UZhiibX`HYW\bc`c[]Y`X]Y`; fØbXib[`XYg`BUh]cbU` 6`cW_WXU]b'HYWXbc`c[m'\bc|Uh]cb'7YbhYf'[YbY\a][h"'9q $k \ fX \ gY \ bYb \ G \ hn \ b \ XYf \ < Ui \ dhghUXh \ DY \ b \ (\ \ \ \ \ \ b \ X \ g \)W$ Ui Z'5bk YbXi b[qZÀ``Y'_cbnYbhf]YfYbž'X]Y'X]Y'`c_U`Y K]fhgW\UZh'Ub_i fVY`b'_ÒbbhYb"'=a '; Y[YbgUhn'ni '6H7 i bhYfghØhnh·7\]bU·6`cWW\U]b·BUW\'Øb[ghYb·5VXYWib[ž k | fX X | Y bYi | Y f gb XYhY 9 b Y h Y Yfgi W Yb Z XUg:]bUbnbYhnk Yf_ XYg VYj O`_Yfi b[gfY]W\ghYb @UbXYg j cfUbni Vf]b[Ybž]bXYa 'Yg'X]Y 5bk YbXi b[gZÀ``Y'XYf 6`cW_WXU]b!HYWXbc`c[]Y`iagYhnh"'8Ug'jca 'A]WfcWX]d FYgYUfWX *±0gh]hi hY *[Y`Y]hYhY *NYbhfi a *k]fX *Ui WX *a]h]b`AbX]qWXYb'I b]j Yfq]hAhYb'i bX': cfqWXi b[q]bqh]hi hYb ni qua a YbufvY]hYbži a 'h]YZYf']b'X]Y'6fubWXY'Y]bni hUi WXYb" 8 UgʻGUa a Y`bʻj cbʻHU`YbhYbʻ]a '6`cW_WXU]b!GY_hcfž'XYf 5i ZVUi 'Y]bYf'bUh]cbU'Yb'k]ggYbgW\UZh`]W\Yb'/ Ua d \wedge Y``]d/



K]ggYbgW\UZhii bX'HYW\bc`c[]Y'X]Y'; fØbXi b['XYg'BUh]cbU` 6`cW_W\U]b'HYW\bc`c[m'≠bbcj Uh]cb'7YbhYf'[YbY\a][h"'

 $9g'k]fX'gY]bYb'G]hn']b'XYf'< Ui dhghUXh'DY_]b['\UVYb'i bX'g]W\'Ui Z \\ 5bk YbXi b[gZ\hankleda'`Y'_cbnYbhf]YfYbž'X]Y'X]Y'`c_U`Y'K]fhgW\UZh Ub_i fVY`b'_\ObbhYb''`$

=a; Y[YbgUhn'ni '6H7'i bhYfghØhnh'7\]bU 6`cW_WXU]b'

BUWW 'Øb[ghYb '5VXYW_i b[ž'k]fX 'X]Y 'bYi '[Y[fØbXYhY '9]b\Y]h

j Yfgi WX Ybž'XUg':]bUbnbYhnk Yf_'XYg'VYj Ò`_Yfi b[gfY]WXghYb

@UbXYg'j cfUbni Vf]b[Ybž']bXYa 'Yg'X]Y '5bk YbXi b[gZÀ``Y'XYf
6`cW_WX U]b!HYWX bc`c[]Y'i a gYhnh" '8 Ug'j ca 'A]WfcWX]d'FYgYUfWX

=bgh]hi hY'[Y`Y]hYhY'NYbhfi a 'k]fX'Ui WX 'a]h']b`ÀbX]gWXYb

I b]j Yfg]hÀhYb'i bX': cfgWXi b[g]bgh]hi hYb'ni gUa a YbUfVY]hYbž'i a

h]YZYf']b'X]Y'6fUbWXY'Y]bni hUi WXYb"'

 $8 \ Ug`GUa\ a\ Y`b`j\ cb`HU`YbhYb`]a\ `6`cW_WXU]b!GY_hcfž`XYf`5i\ ZVUi Y]bYf`bUh]cbU`Yb`k\]ggYbgWXUZh`]WXYb`?fUZh`i\ bX`X]Y`GhY][\ Yfi\ b[\ `XYfhYWXbc`c[\]gWXYb`: A`\][\ _Y]hYb`XYf`9]b`Y]a\]gWXYb`ghY`Yb`YVYbZU``gUi\ Z`XYf`HU[\ YgcfXbi\ b[\ "`$

 $= 3 + Y[YbgUhn'ni ?fmdhck Å\fi b[Yb']gh'X]Y'Jc`_gfYdi V`]_'7\]bU cZYb'XUZØfž'X]Y'JcfnØ[Y'jcb'6`cW_WXU]b'ni 'Yf_i bXYb''DfÅg]XYbh L]'\[3\]bd]b[']gh'YVYbZU``g'Y]b'6YZØfk cfhYfž'Gdf]WXk cfh']a'\[3\]\\ f'&\$\%-\ZXXUgg'X]Y'BUh]cb' X]Y'7\UbW'b'bi hnYb' a i ggŽ'X]Y'X]Y'HYWXbc`c[]YV]YhYh'''9f'VYgWXf]YV'Yg'Ui WX'U`g' k]WXh][Yb'8i fWXVfi WX'VY]'XYfi bUV\\Ab[][Yb'\[\delta bc] Uh]cb'] cb'?YfbhYWXbc`c[]Yb'''$

5 i W 7687 Ui Z'Y]bYb GcW_Y` [YghY` h

9g'j YfhY]`h'Y!7BM]a 'K Yfh'j cb'a Y\f'U`g'&*'A]``]cbYb'l G!8c``Uf'Ub X]Y'9]bk c\bYf'j cb'G\Ybn\Ybž' \exists bUbž'@]Ubmi b[Ub['i bX'<Ub[n\ci ž XUa]h'g]Y'XUg'DfcXi_h'k À\fYbX'XYg': fØ\`]b[gZYghYg'U`g NU\`i b[ga]hhY`'j Yfk YbXYb'_cbbhYb"'8]Y'6Øf[Yf'j cb'7\Yb[Xi i bX'DY_]b['Yf\]Y`hYb'&\$&%'X][]hU`Y'M Ub']b'<Ò\Y'j cb'ØVYf'%\$ A]``]cbYb'l G!8c``Uf"

8 Yf'; YgYhn[YVYf'Yf`Ui VhY'X]Y'Bi hni b['XYg'7687'k À\fYbX'XYf C`ma d]gWXYb'K]bhYfgd]Y`Y'5bZUb['&\$&&']b'XYf'<Ui dhghUXh'Y]bY 9bhgWXY]Xi b[ž'X]Y'\YZh][Y'?cbhfcj YfgYb'Ui g`ÒghY"'

8]Y'I G!GYbUhcfYb'A Ufg\U'6`UW_Vi fbž'Fc[Yf'K]W_Yf'i bX'7mbh\]U@ a a]g'[YXfÀb[h'5a Yf]_Ub]gW\Y'5h\`YhYb'\U`hYb'g]W\'k Y[YbGd]cbU[YVYXYb_Yb'j ca 'Y!7BMZYfb"'8Ug'W\]bYg]gW\Y 5i » Yba]b]ghYf]i a 'gW\`i ['ni fØW_ž'UbZcfXYfb'X]Y'K Ug\]b[hcbYfDc`]h]_Yf'j Yfn]W\hYb'XUfUi Zž'DfcXi _hY'ni '_ca a Ybh]YfYbž'X]Y'g]Yb]W\h'j YfghY\Yb"'

 $\cdot \, \cdot n$

8 Y hU]`a