

GdcfhVcchi bZU``Ui Z'XYa 'GWXk Yf]bYf 5i » YbgYY. NYi [Yb [Ygi WXh°

8]Y'K UggYfgWki hndc`]nY]'GWkk Yf]b'gi Wkh'NYi [Yb'Y]bYg GdcfhVcchi bZU``g'Ua 'GWkk Yf]bYf'5i »YbgYY'j ca '\$"\$+"&\$&("'<]bk Y]qY'YfVYhYb"

\$+"\$, "&\$&(' '%).\$\$

``@UbXYgk UggYfgW\i hndc`]nY]Ua h'A YW_`YbVi f[!Jcfdca a Yfb'

GdcfhVcchi bZU```Ui Z'XYa 'GWXk Yf]bYf 5i » YbgYY.'; Ya Y]bgWX UZh'ghY\h']b'Gcf[Y

5a "\$"*\dagger*]"&\$&(\dagger*z"\gamma\sunitariangle \sqrtangred \text{ZYa} \text{GWk} \text{Yf]bYf} \text{5i} \text{YbgYY\dagger*jb} \text{XYf} \text{B\dagger*A\Y\j} \text{cb} \text{6UX\dagger*?} \text{Y]bYb\dagger*ni} \text{Y]bYa} \text{JcfZU}\dagger*\d

I bZU``\Yf[Ub[i bX YfghY FYU_h]cbYb

 $5\g^X]Y^9]bgUhn_f\lambda ZhY^Ua^IbZU^*cfh^Y]bhfUZYbz^ghY^*hYb^g]Y^YXcWX$

ZYghž'XUgg'bi f'Y]b'VYgW\ÀX][hYg'GdcfhVcch'XYf'A Uf_Y'F]b_Yf
j cf'U["'5i Z'j Yf'YhnhY'DYfgcbYb'gh]Y» Yb'g]Y'b]W\hž'k Ug'X]Y
i fgdfØb[`]W\Yb'6Yf]W\hY'ØVYf'Y]bY'YfbghY'G]hi Uh]cb']b': fU[Y
ghY``h"'8 UfØVYf'\]bUi g'\UhhY'g]W\Y]b'6YhY]`][hYf'Ui Z'gY]bYa '¾hg_]
VYfY]hg'YbhZYfbh"

5 i Zfi Z'ni f'NYi [Yba Y`Xi b[

8]Y'K UggYfgWki hndc`]nY]]bgdY_h]cb'GWkk Yf]b'\Uh'Y]bY
GhfUZUbnY][Y'k Y[Yb'XYf'; YZÀ\fXi b['XYg'GWk]ZZgj Yf_Y\fg
Ui Z[Ybca a Yb'i bX'gi Wkh'bi b'Xf]b[YbX'NYi [Yb'XYg'JcfZU``g"
DYfgcbYbž'X]Y'Yhk Ug'VYcVUWkhYh'\UVYb'cXYf'\DZcfa Uh]cbYb'ni a
K UggYfa chcffUX'[YVYb'_ObbYbž'k YfXYb'[YVYhYbž'g]Wk
hY`YZcb]gWk'cXYf'dYf'9!A U]``ni 'a Y`XYb"

8]Y 6YXYi hi b['ZØf'X]Y ``c_U`Y'; Ya Y]bgW UZh

: Un]h

8]Y '9fa]hhìi b[Yb'ni a 'I bZU``[YgWXY\Yb'Ui Z'XYa 'GWXk Yf]bYf 5i »YbgYY'XUi Yfb'Ub"'8]YgY'G]hi Uh]cb'Yf]bbYfh'i bg'XUfUbž'XUgg g]WXYfY'6YX]b[i b[Yb'ZØf'U``Y'k UggYfgdcfhhfY]VYbXYb'DYfgcbYbYbhgWXY]XYbX'g]bX"'8 Ug'@UbXYgk UggYfgWXi hndc`]nY]Ua hAYW_`YbVi f[!Jcfdca a Yfb'fi Zh'U``Y'6Øf[Yf'Ui Zž'Ui Za Yf_gUa 'ni gY]b'i bX'g]WX'VY]'?Ybbhb]g'j cb'À\b`]WXYb'JcfZÀ``Yb'ni 'a Y`XYbži a 'X]Y'G]WXYf\Y]h'Ui Z'XYa 'K UggYf'ni '[Yk À\f`Y]ghYb"

: \emptyset f'F \emptyset W_ZfU[Yb'ghY\Yb'Zc`[YbXY'?cbhU_ha $\mathring{O}[`]$ W_Y]hYb'ni f JYfZ \emptyset [ib[.

@UbXYgk UggYfgWli hndc`]nY]Ua h'A YW_`YbVi f[!Jcfdca a Yfb

 $"DfYggYghY``Y."DYhfU"?]YW_\ÒZYf$

"HY`YZcb."\$', &\$, #, , +!' %%&

"9!AU]. dfYggY4 k gdU!a j "XY

~ bhYfbYh kkk "dc`]nY]"a j bYh"XY

5i » Yf\U`V'XYf'6ØfcnY]hYb'YffY]W\Yb'G]Y'X]Y K UggYfgW\i hndc`]nY]]bgdY_h]cb'GW\k Yf]b'i bhYf.

``HY`YZcb.'\$',)'#)))+*''\$

``9!A U]`. `k gd]"gW\k Yf]b4 dc`a j "XY`

Cf][]bU`!7cbhYbh'jcb.'@UbXYgkUggYfgWkihndc`]nY]Uah AYW_`YbVif[!JcfdcaaYfbž'ØVYfa]hhY`h'XifWk'bYkg'U_hiY``

8 Y hU]`c

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