

9]bVfi WX ']b '7cYgZY`X. 'Dc`]nY] 'gi WX h NYi [Yb 'bUWX 'J cfZU`` ']b 'Fc\f_Ua d

I bVY_UbbhY`VfYWXYb`Ua`' \$"\$+"&(`]b`<Ui g`Ub`XYf`GhfU»YFc\f_Uad`]b`7cYgZY`X`Y]b"`Dc`]nY]`V]hhYhii a`<]bk Y]gY"

9]bVfi WX]b GYbXYb. 5i gk]f_i b[Yb Ui Z'X]Y G]WXYf\Y]h]b XYf BUWXVUfgWXUZh

5a '8]YbghU[ž'XYa '' \$"'\$\`]'&\$&(ž'YfY][bYhY'g]W\'Y]b'9]bVfi W\']b Y]b'K c\b\Ui g'Ub'XYf'GhfU»Y'Fc\f_Ua d']b'7cYgZY`X"'Nk]gW\Yb , .' \$'I\f'i bX'%)'I\f'j YfgW\UZZhYb'g]W\'i bVY_UbbhY'HÀhYf'Ni [Ub[ni 'XYa '; YVÀi XY"'8Yf'[YbUi Y'JYf`Ui Z'XYg'9]bVfi W\g'i bX'X]Y [Yghc\`YbYb'8]b[Y'g]bX'V]g\Yf'i b_`Uf"

8]Y Fc``Y XYf BUW VUfb i bX XYf; Ya Y]bXY

Gc`W\Y'JcfZ\``Y'k YfZYb'cZh: fU[Yb'ni f'G]W\Yf\Y]h']b'XYf
; Ya Y]bgW\UZh'Ui Z''9]b'9]bVfi W\'_Ubb'XUg'G]W\Yf\Y]hg[YZØ\``XYf
5bk c\bYf'Yf\YV`]W\'VYY]bhf\\W\h][Yb"'BUW\VUfb'gc``hYb
Ui Za Yf_gUa 'gY]b'i bX'j YfX\\\M\h][Y'5_h]j]h\\hYb'VYcVUW\hYb"'8]Y
Dc`]nY]']b'@\X]b[\Ui gYb'\Uh'Y]bY'<ch`]bY'Y]b[Yf]W\\hYh'i bX'V]hhYh
i a '<]bk Y]gY'i bhYf'XYf'HY`YZcbbi a a Yf'\$\&) - %! +- '\$"

G]WXYf\Y]hgj cf_Y\fi b[Yb i bX DfÀj Ybh]cb

±0.5 b V Y h f U W h i X Y g i 9] b V f i W x g i] g h i Y g i k] W x h] [ž i X U g g i 6 Y k c \ b Y f i] \ f Y G] W X Y f \ Y] h g a U » b U \ a Y b i Ø V Y f d f Ø Z Y b " 8 U n i i [Y \ Ò f Y b i b h Y f U b X Y f Y a .

• G]WXYf\Y]hgj cf_Y\fi b[Yb'Ub': YbghYfb'i bX'HØfYb'ghÀf_Yb

- 8]Y = bghU``Uh]cb'| cb'5`Ufa Ub`U[Yb']b'9fk A[ib['n]Y\Yb
- 8]Y'BUW\VUfb'ØVYf'5Vk YgYb\Y]hYb']bZcfa]YfYbž'XUa]h X]YgY'Y]b'5i [Y'Ui Z'XUg'Y][YbY'<Ui g'\UVYb

8]Y'6YXYi hi b['XYf'Dc`]nY]UfVY]h

8]Y'Dc`]nY]'7cYgZY`X'\Uh'bUW\'XYa 'JcfZU``Y]bY'DfYggYa]hhY]`i b[\YfUi g[Y[YVYbž'i a 'XUg'6Yk i gghgY]b']b'XYf'6Yj Ò`_Yfi b['ni gW\ÀfZYb'i bX'ni f'Ni gUa a YbUfVY]h'ni 'Yfa i h][Yb"'9]b'gc`W\Yg 9b[U[Ya Ybh'XYf'Dc`]nY]']gh'YbhgW\Y]XYbXž'i a 'X]Y'?f]a]bU`]hÀh']bXYf'FY[]cb'ni 'fYXi n]YfYb'i bX'X]Y'6Øf[Yf'ni 'gW\ØhnYb"

GWX i ggZc `[Yfib[

8 Yf'9]bVfi W\']b'GYbXYb']gh'Y]b'K YW_fi Z'ZØf'X]Y'; Ya Y]bXYž'ØVYf G]W\Yf\Y]hgj cf_Y\fi b[Yb'bUW\ni XYb_Yb'i bX'g]W\'[Y[YbgY]h]['ni i bhYfghØhnYb"'8]Y'J cfVYi [i b['i bX'X]Y'[Y[YbgY]h][Y K UW\gUa _Y]h'XYf'BUW\VUfb'_ObbYb'YbhgW\Y]XYbX'XUni VY]hfU[Ybž'XUg'F]g]_c'A\b`]W\Yf'J cfZA``Y'ni 'a]b]a]YfYb'i bX'XUg G]W\Yf\Y]hg[YZØ\``XYf'; Ya Y]bgW\UZh'ni 'qhÀf Yb"

 $\label{eq:force_force} F \varnothing W_Z\!fU[\ Y b `V] hhY `Ub .$

Dc`]nY]'7cYgZY`X DfYggYghY``Y HY`YZcb.'\$&) (%!%(!&-\$'V]g'!&-& : UI.'\$&) (%!%(!%-)

Cf][]bU`!7cbhYbh'j cb. 'Dc`]nY]'7cYgZY`Xž'ØVYfa]hhY`h'Xi fW\'bYk g U_hi Y``

B 5:

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