

@YhnhY'Gca a Yfhci f. '9bhXYW_i b[ghci f ni a '< Ui dhZf]YX\cZ'XYf': 7?!@Y[YbXYb

9f`YVYb`G]Y`X]Y``YhnhY`@YgYfhcif`XYf`F<9±BD:5@N`Ua`&%" 5i[igh.'6YgiW\`XYf`:7?!;fÀVYf`]a`<UidhZf]YX\cZ`]b ?U]gYfg`UihYfb"

8]Y'[fc»Y'Gca a YfZYf]YbnY]h'bY][h'g]W\ XYa '9bXY'ni ži bX Yg'ghY\h'Y]b'[Ubn'VYgcbXYfYg'9j Ybh'VYj cf" 5a 'A]hhk cW\ž XYa '&%" 5i [i ghž'j YfUbghU`hYh'X]Y'F < 9=BD: 5@N'Y]bY VYgcbXYfY'@YgYfhci f'ØVYf'XYb' < Ui dhZf]YX\cZ']b ?U]qYfq`Ui hYfb"

 $\pm 0.12] YgYf^{``YhnhYb^{'}:} Yf]Ybk cWkY^{`}UVYb^{'}g]Wk^{'}X]Y^{'}JYfUbhk cfh^{`}]WkYb XYf^{'}F < 9 \pm D: 5 @N.Yhk Ug^{`}[Ubn^{'}GdYn]Y^{``Yg^{'}}]bZU^{``Yb^{'}}UggYb^{''}5V^{'}%$ I \f^{'}XØfZYb^{'}g]Wk^{'}]bhYfYgg]YfhY^{@}YgYf^{'}ibX^{'}: Ubg^{'}UiZ^{'}Y]bY^{'}[YZØ\fhY Hcif^{'}VY[YVYbz^{'}VY]^{'}XYf^{'}XYf^{'} < UidhZf]YX\cZ^{'}]a^{'}A^{hhY}dib_hghY\h^{'} 5ba Y^{'}Xib[Yb^{'}g]bX^{'}VYfY]hg^{'}Y]bYb^{'}HU[^{'}nijcf^{'}a^{'}O[^{`}]Wkz^{'}Ua^{'}AcbhU[z^{'}XYb^{'}%-^{''}5i[ighz^{'}hXUg^{'}HY^{'}YZcb^{'}VYfY]h''$

6Ygi WX XYf: 7?!; fÀVYf

5b[YZØ\fhijcbFc`Z'7cbfUX'ibX'H\caUg'6ihnž'X]Y'VY]XY'jca': 7?!
AigYia'_caaYbž'k]fX'X]Y'; fiddY'ni'XYb'; fÀVYfb'Y]b][Yf\YfUigfU[YbXYf'DYfgÒb`]W_Y]hYb'XYg'%": 7'?U]gYfg`UihYfb
[YZØ\fh"'<]Yfni'nÀ\`Yb'jYfX]YbhY'Gd]Y`Yfž'Gdcfh`Yf'ibX'UiW\:ib_h]cbÀfYž'X]Y'ØVYf'X]Y'\J\fY'\]bkY['Y]bY'dfÀ[YbXY'Fc``Y']b
XYf'; YgW\]W\hY'XYg'JYfY]bg'[Ygd]Y`h'\UVYb"

; YgWX]WX hYb 'j cb '9fZc`[Ybž'? Àa dZYb 'i bX 'XYf'@Y]XYbgWX UZhž'X]Y
XYb 'J YfY]b ']a a Yf 'k]YXYf'[fc » '[Ya UWX h'\ Uh" '8]Y 'Hc i f 'V]YhYh'Y]bY
Y]bn][Ufh][Y '; Y 'Y[Yb\Y]hž'a Y\f'ØVYf'X]Y 'K i fnY`b 'i bX 'X]Y
HfUX]h]cb 'XYg 'J YfY]bg 'ni 'YfZU\fYb 'i bX '[`Y]WX nY]h]['Y]bYb 'C fh'XYf
9f]bbYfi b['ni 'VYgi WXYb"

8Ug =bhYfYggY Ua : 7? VYk U\fYb

Gc`WXY'JYfUbghU`hi b[Yb'nY][Ybž'XUgg`XUgʻ \pm bhYfYggY`Ua :: i » VU`` i bX']bgVYgcbXYfY`Ua :: 7? ii b[YVfcWXYb']gh":8]Y'<]ghcf]Y'XYg JYfY]bgž'XYf']a ' \pm J\f'%-\$\$'[Y[fØbXYh'k i fXYž']gh'fY]WX`Ub <Ò\Ydi b_hYbž'XUfi bhYf'j]Yf'8Yi hgWXY'A Y]ghYfgWXUZhYbž'X]Y']b XYb'%-)\$Yf'i bX'%--\$Yf' \pm J\fYb'[Yk cbbYb'k i fXYb"'5i WX'k Ybb X]Y'A UbbgWXUZh']b'XYb'`YhnhYb' \pm J\fYb'gdcfh`]WX'Y]bY'\c`df][Y'NY]h Xi fWX'YVh'\Uhž'V`Y]Vh'X]Y': Ub[Ya Y]bXY'`cmJ`'i bX'Yb[U[]Yfh"

#D'NY]hYbži]b'XYbYb'j]Y`Y': Ubg'g]W\a Y\f'U`g'bi f'ZØf'X]Y'U_hi Y``YbGd]Y`Y']bhYfYgg]YfYbž'V]YhYh'X]Y'@YgYfhci f'Y]bY'h]YZYfY'J YfV]bXi b[ni 'XYb'K i fnY`b'XYg'J YfY]bg"'Gc`W\Y'9f`YVb]ggY'\Y`ZYbž'X]Y
9f]bbYfi b[Yb'Ub'j Yf[Ub[YbY'9fZc`[Y'k UW\ni\U`hYb'i bX'X]Y
@Y]XYbgW\UZhYb'XYg': i » VU``g'ni 'ZÒfXYfbž'X]Y'@VYf'XUg'Gd]Y`\]bUi g[Y\Yb"'Fc`Z'7cbfUX'i bX'H\ca Ug'6i hn'g]bX'g]W\'Y]b][ž'XUgg gc`W\Y'Hci fYb'b]W\h'bi f'ni f'9f\U`hi b['XYf'; YgW\]W\hY'XYg
J YfY]bg'VY]hfU[Ybž'gcbXYfb'Ui W\'ZØf'Y]bYb'5i ghUi gW\'nk]gW\Yb
XYb'; YbYfUh]cbYb'j cb': Ubg'gcf[Yb"

8]Y'JYfUbghU`hi b['Ua'&%"'5i[igh']gh'b]Wkh'bi f'Y]bY'FØW_gWkUi
Ui Z'X]Y'; YgWk]WkhY'XYg'%": 7'?U]gYfg`Ui hYfbž'gcbXYfb'Ui Wk'Y]b
NY]WkYb'XUZØfž'k]Y'k]Wkh]['Yg']ghž'XYb'8]U`c['ØVYf'X]Y'HfUX]h]cbYb
XYg':i»VU``g'Ui ZfYWkhni Yf\U`hYb"'8Ug' \$\D\YfYggY'XYf''\Øb[YfYb
; YbYfUh]cb'ZØf'X]Y'@Y[YbXYb'i bX'; YgWk]WkhYb']\fYg'JYfY]bg'ni
k YW_Ybž']gh'j cb'[fc»Yf'6YXYi hi b['ZØf'X]Y'Ni _i bZh'i bX'XYb
: cfhVYghUbX'XYf'; Ya Y]bgWkUZh'i bX'XYg'9b[U[Ya Ybhg'fi bX'i a
XYb': 7?"

8 Yf' < Ui dhZf]YX\cZ']b'? U]gYfg`Ui hYfb'V]YhYh'XUZØf'X]Y'dUggYbXY?i`]ggY"' \dib X]YgYf'fi\][Yb'l a [YVi b['_ObbYb'6Ygi WXYf'b]WXh'bi fX]Y'; fÀVYf'VYg]WXh][Ybž'gcbXYfb'Ui WX']b'9f]bbYfi b[Yb

 $gWk Y^{[Yb'ibX'X]Y'; YgWk]Wk hYb'YbYf'A YbgWk Yb'\OfYbž'X]Y'] \fYbHY]^nif': i > VU^{[YgWk]Wk hY'VY][YhfU[Yb'\UVYb'''8]Y': Ø\fib[Ybg]bX'ghYhg'[ih'VYgiWk hž'k Ug'X]Y'FY^Yj Ubn'ibX'XUg'=bhYfYggY'UbXYf'JYfY]bg[YgWk]Wk hY'ibhYfghfY]Wk h''$

6YgcbXYfY '9]bV`]W_Y ']b 'X]Y ; YgW]W hY

5a '9bXY'X]YgYf'VYgcbXYfYb'Hci f'\UVYb'X]Y'HY]'bY\a Yf'X]Y
A Ò[`]W_Y]hz']\fY'9]bXfØ_Y'Ui gni hUi gW\Yb'i bX'j]Y``Y]W\h'gc[UfbYi Y': UWYhhYb'XYg'JYfY]bg`YVYbg'ni 'YbhXY_Yb'''<]ghcf]gW\Yg
K]ggYb'k]fX'[YhY]`h'i bX'X]Y'6YXYi hi b['XYf'HfUX]h]cbgdZY[Y
k Y]hYf[Y[YVYb''': Øf'j]Y`Yz'X]Y'g]W\ZØf'XYb'%'': 7'?U]gYfg`Ui hYfb
]bhYfYgg]YfYbz'ghY``h'X]YgY'@YgYfhci f'Y]bY'k Yfhj c``Y'; Y`Y[Yb\Y]h
XUfz'a Y\f'ØVYf']\fYb'JYfY]b'i bX'XYggYb'; YgW\]W\hY'ni 'YfZU\fYb
i bX'gc'X]Y'Yb[Y'JYfVi bXYb\Y]h'a]h'XYa': 7?'ni 'ghÀf_Yb''

 $8]Y'6YXYihib['jcb':f]YX\OZYb']b'XYf'; YgY``gWWUZh']gh'cZh i bhYfgWWAhnh''G]Y'g]bX'b]WWh'bif'CfhY'XYf'HfUiYfz'gcbXYfb'UiWW; YXYb_ghAhhYbz'X]Y'X]Y'; YgWW]WWhY'ibX'?i`hif'Y]bYf ; YaY]bgWWUZh'k]XYfgd]Y[Y'b'''<math>\pm$ bgVYgcbXYfY'XYf'< UidhZf]YX\cZ']b?U]gYfg`UihYfb'\Uh'Y]bY'k]WWh][Y'Fc``Y']b'XYf'GhUXh[YgWW]WWhYibX'XYf':i» VU``hfUX]h]cb'XYg'%'': 7'?U]gYfg`UihYfb'[Ygd]Y`h''<]Yf'g]bX'nU\`fY]WWY'VYXYihYbXY'DYfgOb`]WW_Y]hYb'VYYfX][hz XYfYb'@YVYbgkYf_Y'V]g'\YihYj]Y`Y'AYbgWWYb'VYY]bZiggYb'ibX]bgd]f]YfYb''

8 Yf' < Ui dhZf]YX\cZk i fXY']a '%- "'\J\f\i bXYfhYfÒZZbYh'i bX`\Uh g]W\gY]hXYa 'ni 'Y]bYa 'VYXYi hgUa Yb'C fh'Ybhk]\W_Y`hz\XYf'gck c\` 9]b\Y]a]gW\Yb'U`g'Ui W\'Hci f]ghYb'Y]bYb'9]bV`]\W_']b'X]Y'fY[]cbU`Y; YgW\]W\hY'V]YhYh"'8]Y'; fUVghÀhhYb'j cb'Gdcfh`Yfb'i bX: i b_h]cbÀfYb'XYg'%"': 7'? U]gYfg`Ui hYfb'g]bX'9f]bbYfi b[Yb'Ub YfZc`[fY]W\Y'NY]hYb'i bX'ghY\Yb']a '?cbhYl h'XYf'9bhk]\W_`i b['XYg:i » VU``g']b'8Yi hgW\`UbXz'k Ug'Y]bYb'VYgcbXYfYb'Ya ch]cbU`Yb K Yfh'j Yf`Y]\h"

<]ghcf]WU``7cbhYlh'cZ'Gdcfhg'A Ya cf]U`g</pre>

 \pm 0 'j]Y`Yb'?i `hi fYb'k Y`hk Y]h']gh'X]Y'; fUVghÀhhY'j cb'Gdcfh`Yfb'i bX

 $k \] WX h] [\ Yb \ DYfgOb`] WX _Y] hYb \ Y] b \ nYb \ hf U`Yf \ 5gdY_h`XYf \\ 9f] bbYfi b [\ g_i \ hi f" \ J Yf [\ Y] WX h a \ Ub \ XYb' < Ui \ dhZf] YX \ c Z'] b \\ ? U] gYfg`Ui hYfb a] h`Ub XYfYb `GdcfhZf] YX \ OZYb z`k] Y `Yhk U`XYa \\ VYfØ \ a hYb `A Ya cf] U` `XYf `6cghcb `F YX `GcI `] b `XYb `I G5 z` nY] [h`g] WX z \\ XUgg`X] YgY`GhÀhhYb `b] WX h`bi f` HfUi YfcfhYz`gcbXYfb `Ui WX \\ D]` [YfghÀhhYb `ZØf`: Ubg`i bX`B UWX Zc` [Yf`g] bX"`8 Yf` 6 Ygi WX`gc` WX Yf CfhY`V] YhYh`5b \ Ab [Yfb `X] Y`A O[`] WX _Y] hz`g] WX`a] h`XYb \\ 9ffi b [YbgWX UZhYb `] \ fYf` \ Xc` Y`ni `j YfV] bXYb `i bX` XYfYb \\ J Yfa AWX hb]g`ni `k ØfX] [Yb"$

9]bY'VYa Yf_Ybgk YfhY'Ÿ\b`]W_Y]h'nY][h'g]W\'VY]gd]Y`gk Y]gY']a
I a [Ub['a]h'XYa '9fVY'j YfghcfVYbYf'Gdcfh`Yf']b'XYb'I G5"'<]Yf
k YfXYb'j]Y`Y'Gdcfh`Yfž'X]Y'Ub'6YXYi hi b['[Yk cbbYb'\UVYbž']b
< U```cZ: Ua Yg'[YY\fhž'k À\fYbX']b'8Yi hgW\`UbX'cZh'X]Y
; fUVghÀhhYb'[YdZY[h'k YfXYb"'8 Ug'gYhnh'g]W\']b'XYf'5fh'i bX'K Y]gY
Zcfhž'k]Y': Ubg']\fY'J YfVi bXYb\Y]h'nY][Yb'''k À\fYbX']b'XYb'I G5
cZh'GhUhi Y'cXYf'D`U_YhhYb'Ui Z[YghY``h'k YfXYbž'Z]bXYb']b
8 Yi hgW\`UbX'cZh'gh]``Y'; YXYb_j YfUbghU`hi b[Yb'cXYf'6Ygi W\Y'XYf
; fUVghÀhhYb'ghUhh'

Gcn]U`Y'i bX'?i`hi fY``Y'6YXYi hi b['j cb; YXYb_ghÀhhYb

8]Y'gcn]U'Y'8]a Ybg]cb'j cb'; YXYb_ghÀhhYb']gh'b]W\h'ni
i bhYfgW\AhnYb"G]Y'ZÒfXYfb'XUg'; Ya Y]bgW\UZhg[YZØ\`i bhYf'XYb
5b\Ab[Yfb'i bX'\Y'ZYbž'Y]bY'_i `hi fY``Y'=XYbh]hÀh'ni 'Zcfa Yb"'=a
: U```XYg'%":: 7'? U]gYfg`Ui hYfb'[Y\h'Yg'b]W\h'bi f'i a 'XYb'Gdcfhž
gcbXYfb'Ui W\ia 'X]Y'JYf_bØdZi b['a]h'XYf'GhUXh'i bX']\fYf
; YgW\]W\hY"'8i fW\'X]Y'Cf[Ub]gUh]cb'j cb': Ø\fi b[Ybž'k]Y'XYf
U_hi Y``Yb'Gca a Yfhci fž'k]fX'b]W\h'bi f'XUg'5bXYb_Yb'Ub'X]Y
j YfghcfVYbYb'Gdcfh`Yf'[Yk U\fhž'gcbXYfb'Ui W\'Y]b'U_hj Yg'@YfbYb

8]Y'FY`Yj Ubn'gc`WXYf'JYfUbghU`hi b[Yb'b]a a h']b'XYf'\Yi h][Yb; YgY``gWXUZh'ni ž'XU']a a Yf'a Y\f'A YbgWXYb'X]Y'Bchk YbX][_Y]h gY\Ybž'ØVYf'X]Y'NY]h'\]bUi g'ni 'XYb_Yb'i bX'JYfV]bXi b[Yb'ni f; YgWX]WXhY'ni 'gWXUZZYb"'8Ug'9b[U[Ya Ybh'XYg'JYfY]bg'i bX'XYf GhUXhž'X]YgYb'9f]bbYfi b[gcfh'U_h]j 'ni 'bi hnYbž'gdf]WXh'6ÀbXY'ØVYf

8 Y hU]`g

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