

: 7A!<][\`][\hg`]a '5i [igh. '< Y]a gd]Y`Yž BUW\ki W\g'i bX DfU_h]_i a ga Ò[`]W_Y]hYb

9fZU\fYb'G]Y'U``Yg'ØVYf'X]Y'U_hi Y``Yb'Gd]Y`Y'XYg'%'': 7 A U[XYVi f[\check{z} 'H]W_Yh]bZcg'i bX' \approx VUb[YVchY'ZØf': Ubg'i bX \Rightarrow bYfYgg]YfhY''

8 Ugʻ = hYfYggYʻUaʻ: i » VUʻʻ]bʻA U[XYVif['VʻY]Vh'ib[YVfcWXYbž'k]Y X]YʻU_hiYʻʻYbʻJYfY]bgU_hjj]hÀhYbʻnY][Ybʻʻ8 Yfʻ%ʻʻ: 7 A U[XYVif[\UhˈgY]hˈgY]bYaʻ5i Zgh]Y[ʻ]bʻX]Yʻnk Y]hYʻ6i bXYgʻ][UʻY]bʻbYi Yg?Ud]hYʻʻ]aʻfY[]cbUʻYbʻGdcfhʻ[YÒZZbYhʻ'8]YʻbÀWXghYbʻK cWXYbghY\bʻ]aʻNY]WXYbʻgdUbbYbXYfʻGd]YʻYʻZØfʻUʻʻYʻ5ʻhYfg_`UggYbʻXYgJYfY]bgžʻi bXʻX]YʻJcfZfYi XYʻUi ZʻX]Yʻ_ca a YbXYbʻ6Y[Y[bib[Ybʻ]gh[fc» "'A]hʻY]bYaʻ_`UffYbʻ: c_i gʻUi ZʻHYUa[Y]gh'i bXBUWXki WXgZÒfXYfi b[ʻgYhnhʻXYfʻJYfY]bʻY]bʻNY]WXYbʻZØfNi gUa a Yb\Uʻh'i bXʻ@Y]ghi b[''

9]b'<][\`][\h'XYf'_ca a YbXYb'9j Ybhg']gh'XUg'<Y]a gd]Y`'[Y[Yb XYb'?Uf`gfi\Yf'G7ž'XUg'Ua 'GcbbhU[ž'XYb'&&"'GYdhYa VYf'&\$&(ž']b XYf'5j bYh'5fYbU'ghUhhZ]bXYh''8]Y'A UbbgW\UZh'k]fX'X]Y
I bhYfghØhni b[']\fYf'hfYi Yb': Ubg'VYbOh][Ybž'i a 'Ui W\'[Y[Yb X]YgYb'\YfUi gZcfXYfbXYb'; Y[bYf'ni 'VYghY\Yb"'H]W_Yhg'g]bX VYfY]hg'ØVYf'XYb'Cb`]bY!H]W_Yhg\cd'i bX'X]Y'cZZ]n]Y``Yb Jcfj Yf_Ui ZgghY``Yb'Yf\A`h`]W\"'Gc`W\Y'Gd]Y`Y'g]bX'b]W\h'bi f k]W\h]['ZØf'X]Y'Di b_hYž'gcbXYfb'ghAf_Yb'Ui W\'X]Y'6]bXi b[nk]gW\Yb'JYfY]b'i bX'5b\Ab[YfgW\UZh"

5_h]j]hÀhYb XYf : fUi Yba UbbgW UZh

8]Y': fUi Yba UbbgW\UZh'XYg'\": 7'A U[XYVi f['k]fX'YVYbZU``g']b XYf'FY[]cbU``][U'U_h]j "'5a '&) "'5i [i gh'&\$&('_ca a h'Yg'ni a

5i ZhU_hgd]Y`[Y[Yb`XYb`%"::J`9fZ]fh"Ia '%(`I\f`k]fX`]a <Y]bf]WX!; Yfa Yf!GhUX]cb`Ub[YdZ]ZZYb"'8]Y`9fk Ufhi b[Yb`g]bX \cWXžXYbb`X]Y`V`Ui!kY]»Yb`:fUiYb`a ÒWXhYb`a]h'j c``Yf`:U\fh`]b X]Y`bYiY`GU]gcb`ghUfhYb"'9]b`YfZc`[fY]WXYf`GU]gcbghUfh`_ÒbbhY`X]Y A ch]j Uh]cb`i bX`XYb`FØW_\U`h`XYf`: Ubg`kY]hYf`ghÀf_Yb"

I&' ibX 9!Gdcfh

9]b k Y]hYfYf VYXYi hYbXYf HY]`XYg J YfY]bg i]gh X]Y
I &' !A UbbgWX UZhž X]Y 'Ua 'GUa ghU['[Y[Yb 'XYb '@ Xk][gZY`XYf': 7
UbhfYhYb k]fX": Øf X]YgY 'i b[Yb 'HU`YbhY i]gh 'YXYg 'Gd]Y``Y]bY
7\UbWYž g]WX 'ni 'VYk Y]gYb i bX 'a Ò[`]WXYfk Y]gY i]b 'X]Y 'YfghY
A UbbgWX UZh 'Ui Zni ghY][Yb" '8]Y 'B UWX k i WX gUfVY]h i]gh 'U`gc 'b]WX h bi f
ZØf 'XYb 'Y][YbYb 'J YfY]bž 'gcbXYfb 'Ui WX 'ZØf 'X]Y '[YgUa hY 'F Y[]cb
j cb '6YXYi hi b[ž 'XU 'g]Y 'hU`Ybh]YfhY 'Gd]Y `Yf '\Yfj cfVf]b[hž X]Y
ni _ØbZh]['Ui Z'\Ò\YfYb '9VYbYb 'gd]Y `Yb '_ÒbbYb"

± Y]bYa 'UbXYfYb'6YfY]WX'gi WXh'XYf'JYfY]b'U_hi Y``Y]bYb'@Y]hYf cXYf'Y]bY'@Y]hYf]b'ZØf'X]Y'6YfY]WXY'9!Gdcfhž'BUWX\U`h][_Y]h'i bX 8][]hU`"'8]Yg'nY][hž'XUgg'XYf'%": 7'A U[XYVi f['g]WX'b]WXh'bi f'Ui Z XYb'hfUX]h]cbY``Yb':i » VU``'_cbnYbhf]Yfhž'gcbXYfb'Ui WX'a cXYfbY HfYbXg'i bX'HYWXbc`c[]Yb']b'gY]bY'JYfY]bgUfVY]h']bhY[f]Yfh"'8]YgY 9bhk]W_`i b['ghY\h']a '9]b_`Ub['a]h'XYa 'U_hi Y``Yb'HfYbXž'X]Y X][]hU`Y'K Y`h'bÀ\Yf'Ub'XYb'Gdcfh'ni 'Vf]b[Yb'i bX']bbcj Uh]j Y ⇒XYYb'ni 'ZÒfXYfb"

5i » YfXYa 'V]YhYh'XYf'J YfY]b'Y]bYb'DfU_h]_i a gd`Uhn']b'XYf
5VhY]`i b['A YX]Yb'i bX'?ca a i b]_Uh]cb'Ub"'8]YgYg'5b[YVch
f]WXhYh'g]WX'Ub'_ca a i b]_Uh]j Y'i bX'_fYUh]j Y'?ÒdZYž'X]Y'Y]bY
@Y]XYbgWXUZh'ZØf': i » VU``i bX'² ZZYbh`]WX_Y]hgUfVY]h'\UVYb"'9]b

DfU_h]_i a ']b'X]YgYa '6YfY]W\'_Ubb'k Yfhj c``Y'9fZU\fi b[Yb'ZØf ni _ØbZh][Y'?Uff]YfYb'Vf]b[Yb'i bX'XYb'DfU_h]_UbhYb'Y]bYb 9]bV`]W_']b'X]Y'5V`Ài ZY'Y]bYg'DfcZ]j YfY]bg'[Yk À\fYb"

8]Y: UbVYhfYi i b['XYg'J YfY]bg'\Uh'ZØf'X]Y'5i gk Àfhggd]Y`Y']b

BØfbVYf['i bX'8 Ufa ghUXh'X]Y'A Ò[`]W_Y]h'[YgW\UZZYbž'X]Y'5bfY]gY

dYf': UbVi g'ni 'cf[Ub]g]YfYb"'8]YgY' \(\daggerap \)]h]Uh]j Y'Yf`Y]W\hYfh'XYb': Ubg

X]Y'HY]`bU\a Y'Ub'XYb'Gd]Y`Yb'i bX'nY][hž'k]Y'k]W\h]['X]Y

I bhYfghØhni b['j cb'XYb'F Àb[Yb'ZØf'X]Y'Gd]Y`Yf']gh"; Ya Y]bgUa 'ni

fY]gYb'ghÀf_h'XUg'; YZØ\`'XYf'; Ya Y]bgW\UZh'i bX'a UW\h'X]Y

5i gk Àfhggd]Y`Y'ni 'Y]bYa 'VYgcbXYfYb'9f`YVb]g'ZØf'X]Y'5b\Àb[Yf"

=bhYfYggYibX; YaY]bgW\UZh

8 Y f '%": 7 'A U[XYVI f['V Y]VhY]b 'n Y b h f U Y f '6 Y g h U b X h Y] 'XY f g d c f h] W Y b ** XY b h]h A h XY f 'F Y[] c b ž 'k c V Y] 'g Y] b '9 b [U[Ya Y b h Z Ø f : U b g 'i b X 'B U W k i W g Y b h g W Y] XY b X '] g h " 8] Y 'V Y j c f g h Y \ Y b XY b G d] Y `Y 'i b X 'J Y f U b g h U 'h i b [Y b 'n Y] [Y b 'XY b 'U b \ U 'h Y b XY b 5 i Z g W k i b ['XY g 'J Y f Y] b g " '6 Y g c b XY f g 'X] Y 'J Y f V] b X i b ['n k] g W Y b XY b 'j Y f g W] Y XY b Y b 'A U b b g W U Z h Y b 'i b X 'X] Y 'U h] j Y '9] b V] b X i b ['XY f : U b g '] b 'X U g 'J Y f Y] b Z i g g Y b " '9] b 'J Y f Y] b ž 'XY f 'Y g 'j Y f g h Y \ h ž H Y U a [Y] g h i b X '; Y a Y] b g W U Z h g [Y Z Ø \ `n i 'Z Ò f X Y f b ž [Y \ h '[Y g h A f h '] b X] Y 'b Y i Y b ' < Y f U i g Z c f X Y f i b [Y b ž X] Y 'X] Y ``U i Z Y b X Y 'G U] g c b 'a] h 'g] W V f] b [h"

<]ghcf]gWX Y `DUfU``Y`Yb `]a 'XYi hgWX Yb ': i » VU``</pre>

 $= \text{ "XYi hgWXYb": i } \text{ VU```[]VhYg'Y]b][Y``\]ghcf]gWXY'JcfZ\hand{A}``Y\z\X]Y \\ \text{DUfU``Y`Yb'ni 'U_hi Y``Yb'9bhk]$$W_i b[Yb'Ui Zk Y]gYb'''9]b'6Y]gd]Y``]gh \\ \text{XYf'5i Zgh]Y['j cb'A UbbgWX UZhYb'Ui g'XYb'i bhYfYb'@][Yb']b'X]Y \\ \text{6i bXYg`][U''' $$\delta \text{XYb'}%--$Yf'\delta \text{Yb'Yf'YVhYb'HYUa g'k]Y'XYf'%'': 7} \\ \text{BØfbVYf['i bX'XYf'A GJ'8i]gVi f['j Yf['Y]WXVUfY'5i Zgh]Y[Y\z\X]Y'X]Y' 6Y[Y]ghYfi b['XYf': Ubg'i bX'XUg' $$\text{hYfYggY'XYf'A YX]Yb} \\ \text{Ub_i fVY`hYb'''8]YgY'5i Zgh]Y[Y'g]bX'b]WXh'bi f'gdcfh`]WX \\ \text{VYa Yf_Ybgk Yfhz'gcbXYfb'VYY]bZi ggYb'Ui WX'XUg'k]fhgWXUZh`]WXY \\ \text{I a ZY`X'XYf'7'i Vg'''}$

8]Y'<YfUi gZcfXYfi b[YbžX]Y'g]W\"Ui g'XYa '5i Zgh]Y['Yf[YVYbž'g]bX'YxcW\"A\b`]W\"[YV`]YVYb. 'Gdcbgcf]b[ž'Ni gW\Ui YfnU\`Yb'i bX'X]Y

\$\text{bhY}[fUh]cb']b'X]Y'6i bXYg`][U!8 mbUa]_'ghY``Yb'a Ugg]j Y

5bZcfXYfi b[Yb'Ub'X]Y'7`i Vg"'8Yf': 7'A U[XYVi f[ž'XYf']b'XYf
U_hi Y``Yb'GU]gcb']b'XYf'&"'6i bXYg`][U'gd]Y`hž'_\ObbhY'a]h

A\b`]W\Yb'<\YfUi gZcfXYfi b[Yb'_cbZfcbh]\Yfhk\YfX\Ybž']bg\Y\ygcbX\YfY

]a '<]bV`]\W_'Ui Z'X]\Y'G]\W\Yfi b['j cb'Z]\bUbn]\Y``\Yb'A]\hh\Y`b'i bX'X]\Y

5bgdfU\W\Y'j cb': Ubg"

<]bhYf[fi bX]bZcfa Uh]cbYb ni f J YfY]bgYbhk]W_`i b[</pre>

 $8 \ Yf: 7 \ A \ U[\ XYVi \ f[\ ``\ Uh'Y]bY \ ``Ub[\ Y'i \ bX'hfUX]h]cbgfY]WXY \\ ; \ YgWX]WX hY']a \ `XYi \ hgWXYb': i \ >VU``ž'X]Y'j \ cb'k \ YWX gY`\ UZhYb \\ 9fZc`[\ Yb'[\ YdfA[\ h']gh''; \ Y[\ fØbXYh']a \ `$U\f'%- *) \ ž'Yf`YVhY'XYf'7`i V']b \\ XYf'88F'Y]bY'FY]\ Y'j \ cb'gdcfh`]WXYb'< O\Yb'i \ bX'H]YZYb'''8]Y \\ : i g]cb'a \]h'XYf'88F!CVYf`][U'bUWX'XYf'K]YXYfj YfY]b][i b['ZØ\fhY ni 'Y]bYf'BYi Ui gf]WX hi b['XYg'J YfY]bg'''$

#D'XYb''YhnhYb'#J\fYb'\Uh'XYf: 7'A U[XYVi f['Xi fWX'ghfUhY[]gWXYA U» bU\a Yb'i bX'Y]b'ghUf_Yg'# [YbX!'i bXB UWXk i WXgZÒfXYfi b[ggmghYa :: cfhgWXf]hhY'Yfn]Y'h"8]YgY: c_i gg]Yfi b['Ui Z'X]Y'5i gV]'Xi b[''4 b[Yf'HU'YbhY']gh
YbhgWXY]XYbXži a '_cb_i ffYbnZÀ\]['ni 'V'Y]VYb"'8Yf'7'i V'\Uh'Ui WX]b'XYb'BUWXk i WXg'Y]ghi b[Yb'j]Y'Yf'Gd]Y'Yf']bj Ygh]Yfhž'X]Y'bi b']b
XYf'YfghYb'i bX'nk Y]hYb'6i bXYg'][U': i » 'ZUggYb"'8]YgY
9bhk]W_`i b[']gh'Y]b'NY]WXYb'Y]bYf'VYk i gghYb'`Ub[Zf]gh][Yb
D`Ubi b[ž'i a ']b'XYf'&"'6i bXYg'][U'b]WXh'bi f'ni 'VYghY\Ybž'gcbXYfb
Ui WX'i a 'dchYbn]Y``'Ui Zni ghY][Yb"'

5_hi Y``Y GhUh]gh]_Yb i bX 8UhYb

@Ui h'XYb'bYi YghYb'GhUh]gh]_Yb'ni f'Ni gWXUi YfYbhk]W_`i b[']b'XYf &"'6i bXYg`][U'nY][h'XYf': 7'A U[XYVi f['Y]bY'dcg]h]j Y'HYbXYbn'VY] XYb'Ni gWXUi YfY]bbU\a Yb"'\D'XYf'GU]gcb'\&\&\'#\&\&\('k i fXYb')a 8i fWXgWXb]hh'Yhk U'%) "\\$\\$'Ni gWXUi Yf'dfc'Gd]Y`']b'XYf'5j bYh 5fYbU'[YnÀ\`h"'8]Yg']gh'Y]b'5bgh]Y[']a 'JYf[`Y]WX'ni f'j cf\Yf][Yb

GU]gcbžk UgʻUi ZʻY]bʻk UWXgYbXYgʻ±bhYfYggYʻUbʻXYfʻA UbbgWXUZh \]bk Y]gh"

±0.6 Yni ['Ui Z'X]Y'@Y]ghi b[Yb']b'XYf'FY[]cbU``][U'nY][Yb'X]Y
: fUi Yb'XYg': 7 'A U[XYVi f['YVYbZU``g': cfhgW\f]hhY/']a '`YhnhYb'≯J\f
\UVYb'g]Y'Xi fW\']\fY'@Y]ghi b[Yb']b'XYf'FY[]cbU``][U'BcfXcgh
j]Y`Y'bYi Y': Ubg'[Yk cbbYb"'8]Y'9]bgW\U`hei chYb'i bX
Ni gW\Ui YfnU\`Yb'g]bX'Y]b'X]fY_hYg'NY]W\Yb'ZØf'XUg'9b[U[Ya Ybh
i bX'X]Y'I bhYfghØhni b[ž'X]Y'XYb'A UbbgW\UZhYb'Ybh[Y[Yb[YVfUW\h
k YfXYb"'Gc`W\Y'9bhk]W_`i b[Yb'g]bX'ZØf'X]Y'Z]bUbn]Y``Y'GhUV]`]hÀh
i bX'X]Y'`Ub[Zf]qh][Y'D`Ubi b['XYq'7`i Vg'i cb'[fc» Yf'6YXYi hi b["'

8]YgY' = DZcfa Uh]cbYb'j YfXYi h`]W\Ybž'k]Y'k]W\h]['Y]bY'gc`]XY'6Ug]gibX'X]Y'I bhYfghØhni b['XYf': Ubg'ZØf'XYb'9fZc`['Y]bYg'JYfY]bg']bXYf'\Yi h][Yb': i » VU```UbXgW\UZh'q]bX"

8 YhU]`g

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