

$GWX]W_gU^gX]U[bcgY.^AUXmgYb^K]^WcI^ibXXYf?UadZia^]\fVUVm^7\Uf^]Y$

GWk Ub[YfY'A UXmgYb'K]'Wcl'Yf\À`h'Y]bY'gWkcW_]YfYbXY 8]U[bcgY.' \Rightarrow f'?]bX''Y]XYh'Ub'U`cVÀfYf'<c`cdfcgYbW'd\U`]Yž k Ug']\f'@YVYb'j YfÀbXYfh"

a 'I G!6i bXYgghUUh'I hU\'Yf`YVhY'A UXmgYb'K]`WcI'k À\fYbX']\fYfGW\k Ub[YfgW\UZh'Y]bYb'i bj cfghY``VUfYb'GW\cW_"'6Y]'Y]bYfFci h]bY!I `hfUgW\U``i bhYfgi W\i b[']b'XYf'%) "'K cW\Y'YbhXYW_hYbX]Y'ŸfnhY'VY]']\fYa 'i b[YVcfYbYb'?]bX'5i ZZÀ``][_Y]hYb']a '; Y\]fb i bX']a '; Yg]W\h"'CVk c\``Y]b'YfghYf'; YbhYgh'Ui Z'XUg'8ck b!GmbXfca 'bY[Uh]j 'Ui gZ]Y`ž'Yf[UV'Y]bY'k Y]hYfY'I bhYfgi W\i b[']b XYf'%, "'K cW\Y'U`Ufa]YfYbXY'BYi][_Y]hYb"

8]Y'9`hYfbž'A UXmgYb'i bX']\f'A Ubb'8Uf]bž'Yf\]Y`hYb'X]Y
j Yf\YYfYbXY'8]U[bcgY'j cb'Y]bYa 'GdYn]U`]ghYb"' \(\frac{4}{3}\)X 'k YfXY'b]Y
X]Y'K cfhY'j Yf[YggYbž'X]Y'Ui g']\fYa 'A i bX'_Ua Yb.'\(\frac{4}{3}\)X'a UWXY
a]f'Gcf[Yb ž 'Yf]bbYfh'g]WX'K]`Wcl'Ub'X]YgYb'_f]h]gWXYb'A ca Ybh''
8]YgY'Ÿi » Yfi b['a Uf_]YfhY'XYb'6Y[]bb'Y]bYg'bYi Ybž
\YfUi gZcfXYfbXYb'?Ud]hY`g']b']\fYa '@YVYb''

5 i ZZÀ``][_Y]hYb ']b 'XYf'; Y\]fbYbhk]W_`i b[

8 Ugʻ6 UV mžʻX Ugʻg]YʻUi ZʻXYbʻB Ua Ybʻ7 \ Uf`]YʻhUi ZYbʻk cʻ`hYbžʻk i fXY a]hʻUʻc VÀfYfʻ< cʻcdfcgYb WYd\ U`]Yʻfk D9ŁʻX]U[bcgh]n]Yfh"ʻ8]Ygʻ]gh Y]bYʻgY`hYbYʻi bXʻYfbghYʻ: Y\`V]`Xi b['XYgʻ; Y\]fbgžʻVY]`XYfʻg]W\`X]Y VY]XYbʻ; Y\]fb\À`ZhYbʻb]W\ hʻ_cffY_hʻYbhk]W_Y`bʻi bXʻj cbY]bUbXYf hfYbbYb"ʻ@Ui hʻj YfgW\]YXYbYbʻ6Yf]W\ hYbʻ]ghʻX]Y K U\fgW\Y]b`]W_Y]hžʻXUggʻY]bYʻGW\ k Ub[YfgW\UZhʻa]hʻX]YgYf 8]U[bcgYʻhUhgÀW\`]W\ ni 'Y]bYfʻ@YVYbX[YVi fhʻZØ\fhž'Ài » Yfgh [Yf]b["

8f"8 ma dbU'K Y]'žY]bY: UW\Afnh]b'ZØf; mbA_c`c[]Y'i bX; YVi fhg\]'ZYžYf`Ai hYfhY'X]Y'8]a Ybg]cb'X]YgYf'8]U[bcgY'i bX'XYbYfbgh\UZhYb'; Ygi bX\Y]hgni ghUbX'XYg': Òhi g"'G]Y'VYhcbhYž'XUgg'X]Y K U\fgW\Y]b`]W_Y]hž'XUgg'Y]b'?]bX'a]h'<D9'XUg'@]W\h'XYf'K Y`hYfV`]W_hž']b'XYf'FY[Y`'gY\f'b]YXf]['gY]"'8]YgY'Dfc[bcgY']gh'b]W\hbi f'Y]b'a YX]n]b]gW\Yg'5b`]Y[Ybž'gcbXYfb'VYY]bZi ggh'Ui W\'XUg Ya ch]cbU`Y'K c\`VYZ]bXYb'XYf'9`hYfb'Ybcfa"

K]`Wcl 'Ài » YfhYž'XUgg'X]YgY'8]U[bcgY']\f'@YVYb'ZØf']a a Yf j YfÀbXYfh'\Uh" →WX'V]b'Yhnh'XUb_VUfYf'ZØf'8]b[Yž'X]Y']WX'j cf 7\Uf`]Yg'8]U[bcgY'ZØf'gY`Vghj YfghÀbX`]WX'[Y\U`hYb'\UVY ž Yf_`ÀfhY'g]Y"'8]YgY'bYi Y'DYfgdY_h]j Y'\Uh']\fYb'5``hU['i bX']\fY K YfhY']b'XYf': Ua]`]Y'ghUf_'[YdfÀ[h"

9a ch]cbU`Y`< YfUi gZcfXYfi b[Yb`ZØf`X]Y : Ua]`]Y

8]Y 'gW\cW_]YfYbXY '8]U[bcgY'\Uh'b]W\h'bi f'5i gk]f_i b[Yb'Ui Z A UXmgYb'i bX'8Uf]bž'gcbXYfb'n]Y\h'Ui W\kY]hfY]W\YbXY
Ya ch]cbU'Y'?cbgYei YbnYb'ZØf'X]Y'[UbnY': Ua]']Y'bUW\g]W\"
K]'Wcl'VYf]W\hYhž'XUgg']\fY'Gcf[Yb'Yhnh'ØVYf'X]Y
<YfUi gZcfXYfi b[Yb'\]bUi g[Y\Ybž'X]Y'a]h'XYf'; YVi fh'Y]bYg
?]bXYg'a]h'VYgcbXYfYb'6YXØfZb]ggYb'j YfVi bXYb'g]bX"'5i W\X]Y
; YVcf[Yb\Y]h'i bX'; Ygi bX\Y]h']\fYf'UbXYfYb'?]bXYf'ghY\Yb'bi b
a Y\f'XYbb'Y']a': c_i g']\fYf'; YXUb_Yb"

8]YFY]gYjcbK]`WclibX`]\fYa 'A Ubb`]gh'U``Yg'UbXYfY'U`g Y]bZUW\"Nk]gW\Yb`5fnhYfa]bYbž: UW\[Ygdf\W\Yb`ibX Yach]cbU`Yb`5igY]bUbXYfgYhnib[Yb`a ØggYb`g]Y`[`Y]W\nY]h][`XYb 5``hU[`a]h`]\fYb`UbXYfYb`?]bXYfb`VYk\\\\\\)h][Yb"'9g`]gh'niXYa`Y]bY <YfUigZcfXYfib[ž'X]Y`6U`UbWY`nk]gW\Yb`XYf':fYiXY`UiZ'X]Y ; YVifhibX`XYb`\\\\b[ghYb`\\\\\Yf'X]Y`Ni_ibZh'niZ]bXYb"

8]YgY'5fh'j cb'GW\k Ub[YfgW\UZh'Vf]b[h'b]W\h'bi f'a YX]n]b]gW\Yž gcbXYfb'Ui W\'dgmW\c`c[]gW\Y': fU[Yb'a]h'g]W\"'8]Y'I bg]W\Yf\Y]h ØVYf'XUg'@YVYb'i bX'X]Y'; Ygi bX\Y]h'XYg'i b[YVcfYbYb'?]bXYg_Ubb'ZØf'k YfXYbXY'9`hYfb'Y]bY'Ybcfa Y'dgmW\]gW\Y'6Y`Ughi b[XUfqhY``Yb"

9]b b Y i Y g ? U d] h Y `] a '@Y V Y b 'X Y f : U a] `] Y

K À\fYbX'g]Y'g]W\'XYa 'I bVY_UbbhYb'ghY``Ybž'j YfÀbXYfh'g]W\'X]Y K U\fbY\a i b['j cb'; `ØW_'i bX': Ua]`]Yb`YVYb'ZØf'A UXmgYb'i bX 8 Uf]b"'8]YgY'G]hi Uh]cb'Yf]bbYfh'g]Y'XUfUbž'k]Y'nYfVfYW\`]W\'XUg @YVYb'gY]b'_Ubbž'i bX'\Uh'g]Y'[Y`Y\fhž'YXYb'A ca Ybh'ni gW\AhnYb"'8]Y'JcfZfYi XY'Ui Z'X]Y'5b_i bZh'j cb'7\Uf`]Y'k]fX'j cb Y]bYf'K Y``Y'XYf'I bg]W\Yf\Y]h'i bX'XYf'Gcf[Yb'VY[`Y]hYhž'XcW\'g]Y g]bX'YbhgW\`cggYbž'X]Y'VYgha Ò[`]W\Yb'JcfUi ggYhni b[Yb'ni gW\UZZYb"

GY`hYbY': Y\`V]`Xi b[Yb'XYg'; Y\]fbg.'9]b , VYfV`]W_

5`cVÀfY`<c`cdfcgYbWd\U`]Y`fkD9Ł']gh'Y]bY`gY\f`gY`hYbY
UbUhca]gW\Y`: Y\`V]`Xi b[ž'X]Y`Ui Zhf]hhž'k Ybb`g]W\`XUg`; Y\]fb`XYg
i b[YVcfYbYb`?]bXYg`b]W\h`f]W\h][`hY]`h"`8]YgY`9f_fUb_i b[`VYhf]ZZh
]b`XYf`FY[Y``X]Y`9bhk]W_`i b[`XYg`: fcbhU``UddYbg`i bX`_Ubb`ni
Y]bYf`J]Y`nU\``j cb`d\mg]gW\Yb`i bX`_c[b]h]j Yb
6YY]bhfÀW\h][i b[Yb`ZØ\fYb"`@Ui h`GW\Ahni b[Yb`hf]hh`<D9`]b`Yhk U`%
j cb`%\$"\$\$\$`V]g`%'j cb`&\$"\$\$\$`; YVi fhYb`Ui Z'i bX`]gh'Y]bY`XYf
\Ai Z][ghYb`I fgUW\Yb`ZØf': Y\`V]`Xi b[Yb`XYg`; Y\]fbg"

8]Y; fØbXY·ZØf'<D9·g]bX·j]Y·ZÀ`h]['i bX·_ÒbbYb'[YbYh]gWkY: U_hcfYbž'l a k Y`hZU_hcfYb'gck]Y·Y]bYb'A Ub[Y``Ub': c`gÀi fYk À\fYbX`XYf'ZfØ\Yb'GWk Ub[YfgWk UZh'i a ZUggYb"'8]YgY9f_fUb_i b['_Ubb']b'i bhYfgWk]YX`]WkYb'GWk K YfY[fUXYb'Ui ZhfYhYbžk Ug'VYXYi hYhž'XUgg'b]Wkh'U``Y'VYhfcZZYbYb'?]bXYf'X]Y'[`Y]WkYbGma dhca Y'cXYf'6YY]bhfÀWkh][i b[Yb'Ui Zk Y]gYb'a ØggYb"

: Ua]`]Ybi bhYfghØhni b['i bX '!fYggci f\\bar{W}b

9`hYfbžX]Y`a]h`XYf`8]U[bcgY`<D9`_cbZfcbh]Yfh`k YfXYbž`VYbOh][YbcZh`i a ZUggYbXY`I bhYfghØhni b["JYfgWX]YXYbY`Cf[Ub]gUh]cbYbV]YhYb`FYggci fWbž`GW\i`i b[Yb`i bX`6YfUhi b[Yb`Ubž`i a :: Ua]`]Yb]b`A\b`]W\Yb`G]hi Uh]cbYb`ni `\Y`ZYb"`Ni a `6Y]gd]Y``_Ubb`X]Y`
<c`cdfcgYbWYd\U`m: ci bXUh]cb`k Yfhj c``Y`\DZcfa Uh]cbYb`i bXIbhYfghØhni b[`VYfY]hghY``Yb"`8]YgY`Cf[Ub]gUh]cb`Zc_i gg]Yfh`g]W\XUfUi Zž`VYhfcZZYbYb': Ua]`]Yb`Y]bY`D`UhhZcfa `ni `V]YhYbž`i a `g]W\Ui gni hUi gW\Yb`i bX`\DZcfa Uh]cbYb`\ØVYf`VYk A\fhY`JYfZU\fYb`i bXh\YfUdYi h]gW\Y`5bgAhnY`ni `Yf\U`hYb"

8 UfØVYf`\]bUi g`\UVYb'j]Y`Y'?fUb_Yb\Ài gYf'i bX'?`]b]_Yb
gdYn]Y``Y'Dfc[fUa a Yž'X]Y'9`hYfb[fi ddYb'ni f'J YfZØ[i b['ghY``Ybž
]b'XYbYb': Ua]`]Yb'I bhYfghØhni b['j cb': UW\`Yi hYb'gck]Y'UbXYfYb
VYhfcZZYbYb'9`hYfb'Yf\U`hYb'_ObbYb"'Gc`W\Y'BYhnk Yf_Y'_ObbYb
YbhgW\Y]XYbX'gY]bž'i a 'Ya ch]cbU`Y'6Y`Ughi b[Yb'ni 'VYk À`h][Yb
i bX'X]Y'<YfUi gZcfXYfi b[Ybž'X]Y'a]h'Y]bYf'gc`W\Yb'8]U[bcgY
Y]b\Yf[Y\Ybž'ni gUa a Yb'ni 'a Y]ghYfb"

5_hi Y``Y`GhUh]gh]_Yb`ni f`: Y\`[YVi fh'i bX`ni @YVYbX[YVi fhYb

9]bY'5bU'mgY'j cb'@Ub[nY]hXUhYb'nY][hž'XUgg'Yhk U'+)'i 'XYf
?]bXYf'a]h'gWk YfYf' < D9'gWk Yfk]Y[YbXY
9bhk]W_`i b[gghÒfi b[Yb'Ui Zk Y]gYbž'k Ug'X]Y' < YfUi gZcfXYfi b[Yb
ZØf'X]Y': Ua]`]Yb'ni gÀhn`]Wk'Yf\Ò\h"'8]YgY'GhUh]gh]_Yb
j YfXYi h`]WkYb'X]Y'Bchk YbX][_Y]h'Y]bYg'ZfØ\nY]h][Yb'GWfYYb]b[g
i bX'XYf'[YbUi Yb'8]U[bcgYži a 'Ub[Ya YggYbY'I bhYfghØhni b[
i bX'6Y\UbX`i b[qd`ÀbY'ni Ybhk]W_Y`b"

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. 'X]Y!bUWX f]WX hYb "b Yh