

K Ugʻa UW\h`` A 7589 gc Y]bn][Ufh][3

K À\fYbX'XYf'?f]Y['i a 'X]Y'Jcf\YffgW\UZh']b'?fmdhc'UbXUi Yfhž gi W\Yb'=bj YghcfYb'ghÀbX]['bUW\'XYa 'bÀW\ghYb'[fc»Yb'<]hhYfž XYf'Ui g'XYf'H]YZY'gW\]Y»h"'9]bY'bYi Y'D`UhhZcfa ž'A YhUWUXYž'\Uh cb`]bY'Y]b][Y'Yfbgh\UZhY'K Y``Yb'[YgW\`U[Ybž'i bX'bUW\'XYa ž'k Ug k]f'V]g\Yf'Ui Z[YXYW_h'\UVYbž'k]fX'g]Y'Y]bYb'ghUf_Yb'K YhhVYk YfV [Y[Yb'gc[Uf'YhUV`]YfhY'?fmdhck À\fi b[Yb'gW\UZZYb"

9]bY'gc`WkY'?fmdhck À\fi b[']gh'A cbYfc"'K À\fYbX'Yf
5i Za Yf_gUa _Y]h'ZØf'gY]bY'YffY[h'<u>8 UhY b gWk i hn!</u>
8]Ybghdfc[fUa a ž']gh'X]Y'A cbYfc!?fmdhca ØbnY'`Yhnh`]Wk
XU\]b[Y\YbX'VY[fYbnhž'XUgg'g]Y']a a Yf'bi f'Y]b
K YfhUi ZVYk U\fi b[ga]hhY`'gY]b'_Ubb"'` A 7589'\]b[Y[Yb']gh'Ub
Y]bY'j c``ghÀbX][Y'i bX'g]Wk'gY`Vgh'Yf\U`hYbXY'D`UhhZcfa
[YVi bXYbž'X]Y'XUg'l h]`]hm!Hc_Yb'Xi fWk[Y\YbX'bi hnh"

±b`X]YgYa '5fh]_Y``gYhnYb`k]f`XYb`` A 7589!Hc_Yb`[Y[Yb`X]Y A cbYfc!A ØbnY`i bX`i bhYfgi W\Ybž'k]Y`gY]bY`Y]bn][Ufh][Yb 9][YbgW\UZhYb`]bbYf\U`V`j cb`A YhUWUXY`XUni 'VY]hfU[Ybž'XUgg'Yf ØVYf`XUg`\]bUi q[Y\hž'k Uq`G]Y`Yfk UfhYb`k ØfXYb"

K Ug]gh A YhUWUXY3

Ni Yfgh'a ØggYb'k]f'bUW\gY\Yb'<u>A YhU_UXY</u>'gY`Vghž'i a 'Y]bYb ?cbhYl h'ni '[YVYbž'k]Y'XUg' A 7589!Hc_Yb'gY]bYb'K Yfh'VY\À`h"

A YhUWUXY'k i fXY'U`g'7ca a i b]hm!nYbhf]YfhY'D`UhhZcfa '[YgWXUZZYb i bX'gc``'Y]b'Cfh'gY]bž'Ub'XYa 'Gd]Y`Yfž'Gd]Y`YYbhk]W_`Yfž'?fmdhc!

♣bj YghcfYb'i bX'; Ua Y:]!9bh\i g]UghYb'ni gUa a Yb_ca a Yb'i bX
ni gUa a YbUfVY]hYb'_ÒbbYb"'A]h'Y]bYa '5fWUXY!?cbnYdh']a '?Yfb
d`Ubh'Ygž'gY]bY': À\][_Y]hYb'ni 'Yfk Y]hYfbž'i a 'Y]bY'5``!]b!CbY!
I a [YVi b['ni 'gWXUZZYbž'i a 'XUg'Gd]Y`Yb'ni 'ZÒfXYfb'i bX'ni
i bhYfghØhnYbž'k Ybb'Yg'g]WX']b'K YV''i bX'XUg'A YhUj YfgY'VYk Y[h"

5`g'HY]`'XYf'GW\UZZi b['Y]bYg'<i Vg'fi bX'i a 'D&9'i bX'; Ua Y:]
V]YhYh'A YhUWUXY'Y]bn][Ufh][Y'A Ò[`]W_Y]hYb'ZØf'; Ua Yf'i bX
9bhk]W_`Yf'''<]bhYf']\fYb'7cbhfc``Yfb'Yf\U`hYb'; Ua Yf'Yl_`i g]j Yb
Ni [f]ZZ'Ui Z'Y]bY'9fk Y]hYfi b['XYf'6]V`]ch\Y_'a]h'D&9!
=b\U`hYbž'Y]bY'[`Y]W\[Yg]bbhY'7ca a i b]hmž'gck]Y'Ui Z'XYa
bYi YghYb'GhUbX'XYf'Gd]Y`YYbhk]W_`i b["'5i Z'XYf'UbXYfYb'GY]hY
XYg'6]`XgW\]fa g'_ObbYb'9bhk]W_`Yf'X]YgY'9bXVYbi hnYf'X]fY_h'U`g
YbhgW\Y]XYbXY'FYggci fWY'YfgW\`]Y»Ybž'X]Y'g]Y'Ui Z'j YfgW\]YXYbY
K Y]gY'bi hnYb'_ObbYb"

8 Yfini [fi bXY``]Y[YbXY`5i ghUi gW\hc_Ybž'XYf'Yg'A YhUWUXY Yfa Ò[`]W\hž'Ui Z'X]YgY'K Y]gY'ni 'UfVY]hYbž']gh'gY]b'` A 7589'I h]`]hm Hc_Yb"'

K Ugʻg]bXʻY]b][YʻhUhgÀW\`]W\Y 5bk YbXi b[gZÀ``YʻZØf`` A 75893

8U'Yg'g]W\'i a 'X]Y'?Yfbk À\fi b['\UbXY`hž'X]Y'ZØf'U``Yg']b A YhUWUXY'j Yfk YbXYh'k]fXž'[]Vh'Yg'[Yd`UbhY'5bk YbXi b[gZÀ``Yž

- $5 g^5 fWUXY^nU^Yb^G Y^8 Z^i a^U g^Yk A^hY^H hY^ni^gd Y^Yb"$
- HY]`bU\a Y`Ub`#DfY]gUi gnU\`i b[Yb`ZØf'; Ua]b[!Hi fb]YfYž
 X]Y`Ui Z'XYf'D`UhhZcfa 'UV[Y\U`hYb'k YfXYb
- GhU_]b['XYg'Hc_Ybgž'i a 'dUgg]j Yg'9]b_ca a Yb'ni Yfn]Y`Yb
- 6Y`c\bib[Yb'ZØf'X]Y' → hYfU_h]cb'a]h'XYf'7caaib]hm fGWXfY]VYb'jcb'FYnYbg]cbYb#8]g_igg]cbYbŁ
- ; Ua Y:]!VYnc[YbY`NU\`i b[Yb`ZØf`9bhk]W_`i b[ž'HYghgž A YhU[fUbhq'i bX'a Y\f

K Y]hYfY 5bk YbXi b[gZÀ``Y VYZ]bXYb g]W]b XYf 9bhk]W_`i b[i bX j Yf`Y]\Yb XYa `Hc_Yb a]h ni bY\a YbXYf FY]ZY XYf D`UhhZcfa k Y]hYfYb Bi hnYb " 9g]gh XYf Ui hUf_Y 5gdY_h XYf 7ca a i b]hm! i bX Gd]Y `Ybhk]W_`i b[žX]Y g]W [Y[YbgY]h]['bÀ\fYb j Yf`Y]\h XYa ` A 7589 I h]`]hm Hc_Yb gY]bYb Y]bn][Ufh][Yb 'J cfhY]`"

K Ugʻ]ghʻXYfʻ< Ui dhi bhYfgWX]YXʻnk]gWXYb A cbYfcʻi bXʻ` A 75893

6Y] XYf'I bhYfgi Wki b['XYf'BUWk\U`h][_Y]hgUgdY_hY'VY]XYf Cdh]cbYb']gh'Yg'Y]bXYi h]['XYf'Xi fWkgWk`U[YbXY'I bhYfgWk]YX']a Bi hnYbž'XYf'Yg' A 7589'Yfa Ò[`]Wkhž'ØVYf'XYf'A cbYfc!A ØbnY'ni [`ÀbnYb"

A cbYfc']gh']a 'K YgYbh`]W\Yb'Y]bY'GhUbXUfX!?fmdhck À\fi b[ž'k]Y 6]hWc]b'cXYf'9h\YfYi a "'5`g'gc`W\Yg']gh'Yg'b]W\h'j cb'VYgh]a a hYb Dfc Y_hYb'cXYf'9bhk]W_`i b[Yb'gY]bYf'6YhfY]VYf'[Yhf]YVYb"'\d\b\began{equation}
6Yni ['Ui Z'X]Y'\d\began{equation}
Ygh]h]cb'i bhYf`]Y[h'Yg'XYa 'Di g\'i bX'Di ``'XYf BUW\ZfU[Y''c\bY'k]f_`]W\Yb'Gd]Y`fUi a ž'gY]bYb'K Yfh'Xi fW\\jYfVYggYfhY'@Y]ghi b['cXYf'Yfk Y]hYfhYb'Bi hnYb'ni VYY]bhfÀW\h][Yb"'8]Yg'a UW\h'Y]bY'Yhk Ug'f]g_UbhYfY'\d\bj Ygh]h]cbž k]Y'Yg'VY]'XYf']gh'UVgc`i hY'; bUXY'XYg'A Uf_hYg'i bX'U``Y A cbYfc!BUW\f]W\hYbž'X]Y'ni Zh``]['j YfÒZZYbh`]W\h'k YfXYb"

a ; Y[YbgUhn'XUni ']gh' A 7589']b'Y]b'7ca a i b]hm![YghYi YfhYg DfcY_h'a]h'Y]bYf'J]Y`nU\`i bhYfgW\]YX`]W\Yf'i bX'dfU_h]gW\Yf 5bk YbXi b[gZÀ``Y']bhY[f]Yfh"8]Yg'U``Y]b'V]YhYh'Y]bY']b\ÀfYbhY I bhYfghØhni b[ž'X]Y'VY]'A cbYfc!?fmdhc]bj Ygh]h]cbYb'j Ò``][i bVY_Ubbh']gh"'6Y]'XYf'K U\`j cb' A 7589'i bX'ghY``j YfhfYhYbX'ZØf A YhUWUXY'ghY\h'Ui W\'bUW\'5VgW\`i gg'XYf'≠bj Ygh]h]cb'Y]b [Yk]ggYg'A U» 'Ub'≠bdi h'ni f'JYfZØ[i b["

5``Y`bYi Yb`: i b_h]cbYbžX]Y`Ui Z`XYf`D`UhhZcfa `YfgWXY]bYbž`cV`g]Y j cb`XYb`9bhk]W_`Yfb`\]bhYf`A YhUWUXY`ghUa a Yb`cXYf`j cb`XYf 7ca a i b]hm`gY`Vgh`ghUa a Ybž'_ObbYb`X]fY_h`ni a `dchYbn]Y``Yb 9f[YVb]g`j cb`` A 7589`VY]hfU[Yb"`8]YgYf`Y]bn][Ufh][Y`5bgUhn V]YhYh`U`9VYbY`XYg`9]bZ`i ggYg`ØVYf`X]Y`Ni _i bZh`XYg`Hc_Ybgž XUg`ZØf`Y]bY`A cbYfc!?fmdhc]bj Ygh]h]cb`b]WXh`j YfZØ[VUf`]gh"

=gh'A YhUWUXY'fA 7589Ł'Y]bY'[i hY =bj Ygh]h]cb3

K]f [`Ui VYbž XUgg `A 7589 XUb_ XYf Cf][]bU`]hÀhi bX

: c_i gg]Yfi b[XYg [YgUa hYb A YhUWUXY!Dfc Y_hg Y]bY ZUbhUgh]gWXY

; Y Y [Yb \Y]h]gh" 8]Y i bnÀ\`][Yb 5bk YbXi b[gZÀ``Y Ui Z XYf

[YgUa hYb D`UhhZcfa ž _ca V]b]Yfh a]h XYa GhUfh XYg Dfc Y_hg]a

Yl d`cX]YfYbXYb K UWXghi a gVYfY]W XYg ?fmdhc!; Ua]b[ž[YVYb
i bg Ni j Yfg]WX hž XUgg A YhUWUXY]b Y]bY dcg]h]j Y F]WX hi b[[Y\h"

K Ybb'; Ua]b[ž'?fmdhcž' ⊕j Ygh]YfYb'cXYf'K YV' 'Ui Z' ♠fYf

⊕hYfYggYbg`]ghY'ghY\Ybž'Ya dZY\`Yb'k]f' ♠bYb'Xf]b[YbXž'` A 7589

]a '5i [Y'ni 'VY\U`hYbž'k À\fYbX'X]Y'9bhk]W_`i b['j cb'A YhUWUXY k Y]hYf'j cfUbgWXfY]hYh"'A]h'ghUf_Y

D`UhhZcfa i bhYfghØhni b[A YhUWUXY'fA 7589Ł'_ÒbbhY'Y]bY

ZUbhUgh]gWXY'Cdh]cb'gY]bž'X]Y'XUfUi Z'k UfhYhž'ni [YgWX`U[Yb'ni k YfXYb"

 $G]Y _ObbYb A cbYfc _Ui ZYb \]Yf"$

8 Y hU]`c

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