

6cfi gg]U'A ÒbW Yb[`UXVUW.'?cbÅa ÒW hY'k YW gY`b' 'K Ug'_ca a h'U`g BÀW ghYg3

A Ubi ?cbå a ÒWk hY 6cfi gg]U A ÒbWk Yb[`UXVUWk 'j Yf`UggYb" GhY\h'7\f]ghcd\ ?fUa Yf'j cf'Y]bYf'?Y\fhk YbXY3'BYi YghY 9bhk]W_`i b[Yb']a 'HfUbgZYfa Uf_h"

8]Y '9bhk]W_`i b[Yb'fi bX'i a '6cfi gg]U'A ÒbWXYb[`UXVUWX 'gcf[Yb XYfnY]h'ZØf'8]g_i gg]cbYb']bbYf\U`V'XYf': i » VU``[Ya Y]bgWXUZh" K À\fYbX'X]Y 'HfUbgZYfZf]ghYb'bÀ\Yf'fØW_Ybž'Yfk Y]gh'g]WX'X]Y G]hi Uh]cb'i a 'Y]b][Y'Gd]Y`Yf'U`g'VYgcbXYfg'gdUbbYbX"

8]Y 6Yk Y[ib[Yb Ui Z XYa HfUbgZYfa Uf_h

5_hi Y``VYZ]bXYh`g]W`XYf`? UXYf`j cb`6cfi gg]U`A ObWXYb[`UXVUWX]a I a Vfi W.žk cVY]`Gd]Y`Yf`k]Y`A Ubi `?cbÅ`i bX`B]Wc`9`j YX]`]a : c_i g`ghY\Yb"`8Yf`; YgWXÀZngZØ\fYf`Gdcfhž`F c`UbX`J]f_i gž]bZcfa]YfhY`X]Y`A YX]Yb`ØVYf`XYb`GhUhi g`ei c`k À\fYbX`Y]bYg HfU]b]b[g`U[Yfg`Ua `HY[YfbgYY"`6YgcbXYfg`]a `<]bV`]W_`Ui Z`?cbÅ Ai »YfhY`J]f_i gž`XUgg`X]YgYf`XYb`7`i V`[YfbY`j Yf`UggYb`k ØfXY" ?cbÅž`XYf`]b`XYf`I &'!BUh]cbU`a UbbgWXUZh`j cb`: fUb_fY]WX`gd]Y`hž\Uh`gY]bYb`K YWXgY`k i bgWX`ZfØ\nY]h][`[YAi »Yfh"8]YgY`HUhgUWXY j YfXYi h`]WXhž`XUgg`Ui WX`YfZc`[fY]WXY`Gd]Y`Yf`cZh`bUWX`bYi Yb <YfUi gZcfXYfi b[Yb`gi WXYb"`JYfAbXYfi b[Yb`]b`Y]bYa `HYUa _ObbYb`gck c\``dcg]h]j Y`U`g`Ui WX`bY[Uh]j Y`5i gk]f_i b[Yb`Ui Z`XYb Ni gUa a Yb\U`h`i bX`X]Y`9f[YVb]ggY`\UVYb"

8]YG]hi Uh]cbjcbB]Wc9jYX]

 $6n[~``"B]Wc~'9`j~YX]'Ai~~YfhY~'J~]f_i~gž'XUgg~'V]g\Yf~_Y]b~'dUggYbXYg~5b[~YVch'Y]b[~Y[~Ub[~Yb~']gh"~9`j~YX]ž'XYf~bUW~'bYi~b~'\J\\fYb~']b~$

; `UXVUW\ 'ØVYf`Y]bY`JYfÀbXYfi b['bUW\ XYb_hž'k UfhYh`XUfUi Zž`XUgg g]W\ 'Y]bY`]bhYfYggUbhY`; Y`Y[Yb\Y]h 'Yf[]Vh"\8]YgY`k UfhYbXY $< U`hi b[`k]XYfgd]Y[Y`h`X]Y`G]hi Uh]cb`j]Y`Yf`Gd]Y`Yf`]b
HfUbgZYfd\UgYbž'k c`I bg]W\Yf\Y]hYb`i bX`<math><$ c\$\overline{Z}\bi b[Yb`<UbX`]b $< UbX`[Y\Yb"$

$?Y\fhk\YbXY\VY]\floor{5}{1}$

9]b'k Y]hYfYf'Gd]Y`Yfž'XYf'XYfnY]h']a 'A]hhY`di b_h'ghY\hž']gh
7\f]ghcd\'?fUa Yf''; YfØW\hY'ØVYf'Y]bY'a Ò[`]W\Y
J YfhfU[gUi Z'Ògi b['a UW\hYb'X]Y'Fi bXYŽ'XU'?fUa Yf'XUfØVYf
bUW\XYb_`]W\'gW\Y]bhž'k Ug'gY]bY'gdcfh`]W\Y'Ni _i bZh'VYhf]ZZh''
J]f_i g'ghY``hY'_`Ufž'XUgg'X]Y'9bhgW\Y]Xi b['`Yhnh`]W\'VY]'?fUa Yf
`]Y[h"'8]YgY'I bg]W\Yf\Y]h']``i ghf]Yfh'X]Y'?ca d`YI]hÀh'XYf
dYfgÒb`]W\Yb'9bhgW\Y]Xi b[Yb'j cb'5h\`YhYbž'VYgcbXYfg'k Ybb'g]Y
i a ']\fY'?Uff]YfYd`Ubi b['i bX'9]bgUhna Ò[`]W_Y]hYb']a 'HYUa
[Y\Yb"

8]Y 5i gk]f_i b[Yb Ui Z X Ug HY Ua

8]Y; YgdfÀWXYi bX; VYfY[i b[Yb'fi bXi a 'X]Y'5V[Àb[Y'j cb ?cbÅž'9'j YX]'i bX'?fUa Yf'j YfXYi h']WXYb'Y]bY'VfY]hYfY'H\Ya Uh]_
]a :: i » VU``. 'HYUa g'a ØggYb'ghÀbX][']\fY'Gd]Y`Yf'Yj U`i]YfYb'i bX
UbdUggYbži a 'gck c\``gdcfh`]WXY'9fZc`[Y'U`g'Ui WX'k]fhgWXUZh`]WXY
GhUV]`]hÀh'ni '[Yk À\f`Y]ghYb"'8Yf'?UXYfk YWXgY``_ÒbbhY'b]WXh'bi f
X]Y'HYUa XmbUa]_ž'gcbXYfb'Ui WX'X]Y'6Yn]Y\i b['nk]gWXYb'JYfY]b
i bX'Gd]Y`Yfb'bUWX\U`h]['VYY]bZi ggYb"'Gc`WXY'JYfÀbXYfi b[Yb
YfZcfXYfb':]b[Yfgd]hnYb[YZØ\`ži a 'gck c\``X]Y'gdcfh`]WXYb
5a V]h]cbYb'U`g'Ui WX'X]Y'dYfgÒb`]WXY'9bhk]W_`i b['XYf'Gd]Y`Yf'ni
VYfØW_g]WXh][Yb"

: Un]h. '9]b '6`]W_ ']b 'X]Y 'Ni _i b Zh

± 'XYb'_ca a YbXYb'K cWXYb'k]fX'g]WX'YbhgWXY]XYbžcV'i bX'k]Yg]WX'X]Y'G]hi Uh]cb'fi bX'i a '6cfi gg]U'A ÒbWXYb[`UXVUWXk Y]hYfYbhk]W_Y`b'k]fX"'8]Y'JYfY]bgdc`]h]_ž'[YdUUfh'a]h'XYb]bX]j [Xi Y``Yb'N]Y`Yb'XYf'Gd]Y`Yfž'k]fX'a U»[YV`]WX 'XUfØVYf

YbhgWXY]XYbž'k]Y'XUg'HYUa']b'X]Y'bYiY'GU]gcb'ghUfhYh''9g'V`Y]Vh UVnik UfhYbž'cV'g]WX'?cbÅž'9`jYX]'ibX'?fUaYf'kY]hYf\]b']a JYfY]b'Yb[U[]YfYb'cXYf'Y]bY'bYiY'<YfUigZcfXYfib['UbbY\aYb"

B 5;

8 Y hU] `c

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