

MDIA1002

A YX]U/7caaib]WUh]cb7cbhYlhg

HYfa 'C bY''##'&\$&\$

7ci fgY'Cj Yfj]Yk

'GhJZZ'7cbhJWh'8YhJ]`g'

'7cbj Ybcfg'

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
@ci]gY F Uj Y``]	`"fUj Y``]4 i bgk "YXi "Ui	Hi YgXUmg'%"\$\$'! '"\$\$'fXfcd']bŁ'cf'Vm Uddc]bha Ybh'Zcf	KYVghYfž@YjY` 'žFa''‱B	
		ch\Yf'ha Yg		

'Hi hcfg'

B Ua Y	9a U]`	5j U]`UV]`]m	@cWUh]cb	D\cbY
>UbY Gci h\k UfX	^gci h\k UfX4 i bgk "YXi "Ui	7 cbhJWhj]U Ya U]`		
J UʻYbhjbUʻ6Ui	j "VUi 4 i bgk "YXi "Ui	7 cbHJWhj]U Ya U]`	K YVghYfž" ‱8	
H\YfYgU ⁻ A]``Yf	h\YfYgU"a]``Yf4 i bgk "YXi "Ui	7 cbHJWhj]U Ya U]`		
>c\b'6i fZ th	gUa 4 i bgk "YXi "Ui	7 cbHJWhj]U Ya U]`		
8 Uj]X 8 U Y	X"XU`Y4 i bgk "YXi "Ui	7 cblWUhj]U Ya U]`		

GWXcc`7cbHJWhi±bZcfa Uhjcb

Fcca " %&ž`Yj Y`" FcVYfhK YVghYf'6i]`X]b[

D\cbY. 'f\$&Ł'-',) '(,) *

9a U]`. 'gUa 4 i bgk "YXi "Ui

K YVg]hY. \hdg.##gUa "Ufhg"i bgk "YXi "Ui

 $\label{eq:hamiltonian} $$HY'GWCC``cZhY'5ftg'UbX'AYX]U'kci`X``]_Y'hc'FYgdYWM\cong \cong m5W_bck`YX[Y'h\Y'HfUX]hjcbU``7i ghcX]Ubgž h\Y'6YXY[U'`fPYbg]b[hcb'WJa di gŁž'; UX][U'`fP]hmUbX'5fh\''`8Yg][b'7Ua di gYgŁ'UbX'h\Y'B[i bbUk U` dYcd'Y'fbi ghfU`]Ub'8YZYbW': cfW'5WJXYa m]b'7UbVYffUŁ'cZh\Y'`UbXg'k\YfY'YUW\'WJa di g'cZl BGK ']g`cWJhYX''$

7ci fgY 8YHJ] g

7 fYX]hDc]bhg *

Gi a a UfmcZh\Y 7ci fgY

Gi VYWh5fYU. ? WW[S

H\]g`Wci fgY`Wcj Yfg`U`fUb[Y`cZdfcZ\gg]cbU``Wca a i b]\Wlficb`dfU\Wf)\Wg`]b`>ci fbU`]ga ž`Di V`]\WFY`\Uf]cbg`UbX 5Xj Yffig]b['hc`dfcj]XY`mci 'k]h\`U`gc`]X`Zci bXUficb`Zcf`Z fh\Yfgh XmUbX`dfcZ\gg]cbU``Yb[U[Ya Ybh'`\Mci k]``XYj Y`cd`U`\Wf]fj\Wl``UbX`h\Ycf]nYX`i bXYfghUbX]b['cZh\Y`g]h UhYX`bUhi fY`cZ\\can a i b]\WlficbždUffi\W`\Ufm h\Y`]a dU\WicZcb[c]b[`]bXi ghfm\W\Ub[Y`cb`a YX]U`Zcfa g\"\Mci 'k]```VY`Yei]ddYX`hc`XYj Y`cd`dfc!U\Wfj Y`UbX \\Y\Ufij Y`ghfUhY[]\Yg`]b`hYfa g`cZhYI hdfcXi \Wfjcb`UbX`UbU`mg]gž`Zc\W gg]b['cb`dfcZ\ygg]cbU``k f]hhYb`[YbfYg`UbX\ck 'h\YmUfY`UXUdh\X`hc`gi]hX]ZZ\fYbhdi fdcgYg`UbX'd`UhZcfa g\"

7 ci fgY @YUfb]b[Ci hMca Yg

- %"]XYbhjZmh\Y`]a dUWhcZghfi Wi fU``W\Ub[Yg`]b`Wcaaib]WUhjcb`]bXi ghf]Yg`cb`Wcaaib]WUhj Y`dfUWjWYg UbX`Zcfag
- &" dfcXi WYž'UXUdh'UbX'di V`]g\`Wca a i b]WUh]j Y'hYI hg'Uddfcdf]UhY'hc'HUf[YhYX'WcbhYI hg'UbX'd`UhZcfa g ' "]XYbh]ZmUbX'Udd`m'VUg]Wdf]bW]d`Yg'cZdfcZYgg]cbU``Wca a i b]WUh]j Y'gHUbXUfXg

HYUWX]b[GhfUhY[]Yg

H\]g`Wci fgY`Wcj Yfg`U`fUb[Y`cZdfcZ\gg]cbU``Wca a i b]\Wlficb`dfU\Wf\\g']b`>ci fbU`]ga ž`Di V`]\WFY`Uf\cbg`UbX 5Xj Yff\g]b['fc`dfcj]XY`ghi XYbhg`k]h\`U`gc`]X`Zci bXUf\cb`Zcf`Z ff\\Yf`ghi XmUbX`dfcZ\gg]cbU``Yb[U[Ya Ybh' H\Y`Wci fgY`dfcj]XYg`U'h\YcfYf\\W\`ZTUa Yk cf_`Zcf`i bXYfghUbX]b['W\ffYbhWcbhYl hg`cZW\Ub[Y`]b`fY`Uf\cb`hc bYk g`\wh\Ygž`Uhh\bh\cb`UbX`Vi g]bYgg`a cXY`gž`UbX`h\Y`]a dU\\fcZU```h\YgY`cb`h\Y`a YX]U`Zcfa g`h\UhUfY dfcXi \WX"`Ghi XYbhg`k]```VY`Yei]ddYX`hc`VY`dfc!U\\fij Y`UbX`\\YYUf\j Y`]b`hYfa g`cZhYl hdfcXi \\frac{\text{W}}{\text{C}}\UbX\Ub\`ng]g"

5ggYgga Ybh

5ggYgga YbhYl hYbg]cbg`UfY`CB@V1[]j Yb`j]U`GdYVJU``7cbg]XYfUh]cb`h\Uh]g`gi Va]hhYX`j]U`a mi bgk `hc`h\Y Wti fgY`Wtbj Ybcf"`Nci f`h hcf`WUbbch[]j Y`Yl hYbg]cbg"

⊋mci 'UfY'fY[]ghYfYX'k]h\`I BGK 'X]gUV]`]hmgYfj]\W'gž'd`YUgY``Yhmci f'hi hcf'UbX'h\Y'7cbj Ybcf'f@ci]gY FUjY``]^"fUjY``]4 i bgk "YXi "Ui Ł'_bck "

.

5ggYgga Ybh'HUg_g'

5ggYgga Ybh'tUg_	K Y][\h	8iY'8UhY	Gh XYbh@YUfb]b[CihWcaYgʻ5ggYggYX
DfcZYgg]cbU`Kf]hjb['HUg_'%'	&) ı	%&#\$' #&\$&\$`\$).\$\$`DA</td><td>&Ž</td></tr><tr><td>DfcZYgg]cbU`Kf]hjb['HUg_'&'</td><td>')।</td><td>% #\$(#&\$&\$`\$).\$\$`DA</td><td>&Ž</td></tr><tr><td>91 Ua]bUh]cb</td><td>(\$1</td><td>8 i f]b['9 l Ua 'DYf]c X &#)!%*#)"'9 l UWfi8 UHY'HVU</td><td>%2&2</td></tr></tbody></table>	

5ggYgga Ybh'8YhJ]`g

5ggYgga Ybh'% 'DfcZYgg]cbU` 'K f]h]b['HUg_'%

GhUfh'XUhY.

8YHJ]`g. `+) \$ `k cfXg"`: YYXVUW_`dfcj]XYX`j]U`@A G

5XX]h]cbU`XYhJ]`g.

D'YUgY gYY A ccX'Y ZcfZ fh\Yf XYgf]dh]cb"

 $\label{thm:limit} \begin{tabular}{ll} Hi fb]h]b"UbX"gh XYbhg"Xc"bchgYY"Hi fb]h]b"UbX"gh XYbhg"Xc"bchgYY hi fb]h]b"UbX"gh XYbhg"Xc"bchgYY hi fb]h]b"UbX"gh XYbhg"Xc ha fb]h XYbhg XYbhg"Xc ha fb]h]b"UbX"gh XYbhg XY$

5ggYgga Ybh& DfcZYgg]cbU K f]h]b[HUg_ &

GHJfh'XUhY.

8YHJ]`g. `+) \$!k cfXg"`: YYXVUW<u></u> 'dfcj]XYX`j]U`@A G"`

5XX]h]cbU`XYhU]`g.

D`YUgY`gYY`A ccX`Y"

 $\label{thm:limit} \begin{tabular}{ll} Hi & fb \end{tabular} $$ h' \end{tabular} $$ fb \end{tabular} $$ fb \end{tabular} $$ h' \end{tabular} $$ fb \end{tabular} $$ h' \end{tabular} $$ fb \end{tabular} $$ h' \end{tabular} $$ fo \end{tabular} $$ h' \end{tabular} $$ h' \end{tabular} $$ fo \end{tabular} $$ h' \end{tabular} $$ h$

5ggYgga Ybh' . '9l Ua]bUh]cb

GhUfh'XUhY.

 $\hbox{8YMJ}\^{g}. \hbox{`\&!\ci fg": YYXVUW_"j]U"@A G}\\$

 $5\,XX]h]c\,b\,U^{\,\cdot}\,XYhJ]^{\,\cdot}g.$

D`YUgY`gYY`A ccX`Y"

 $\label{eq:higher_problem} \mbox{Hi fb]h]b "gYhh]b[. "H\]g"]g"bch"U"Hi fb]h]b "Ugg][\mbox{ba Ybh}$

5 https://bxubww.Fyei]fyaybhg

 $\label{eq:matching} \begin{tabular}{ll} MCi^{-1} UffY^*glfcb[`mYbWci^*fU[YX^*hc^*UffYbX^*U^*]"YWi^*fYg" \\ \end{tabular}$

7ci fgY GWX YXi `Y

J]Yk 'WUgg'ha YHUV'Y

H]a YtUV`Y

8 UHY	HmdY	7 cbhYbh
8 UhY K YY_'%'%+': YVfi Ufm!'&% : YVfi Ufm	@YWi fY	7 cbhYbh <y``c°`<y``c°`h\y`wcaaib]wuh]cb']bxighf]ygʻubx d`yugy`zyy`ztyy'hc'ug_'eiygh]cbg']b'h\y``ywify":#h<="" mci"'="" td=""></y``c°`<y``c°`h\y`wcaaib]wuh]cb']bxighf]ygʻubx>

	D`YUgY`gYY`A ccX`Y`Zcf`XYHJ]`g"	
	Hi lcfjU`	Hi hcf]U`gʻghUfhiH< +GʻK 99? "'FYaYaVYf'h\YfY'UfY cZhYbʻai`h]d`Y'hi hcf]U`gʻfi bb]b['Uhih\Y'gUaY'h]aYžgc
-		

I		"@Y[Ubhc"]b'AccX`YŁ
		CdhjcbU`FYUXjb[.'@Ygn_jYk]\Mž5'&\$%+'f5``&' h\]b[g'kfcb['k]h\'DYdg]fg'?YbXU``>YbbYf'5XfzBYk GhJhYgaUbž')'5dfj`flc'hc''@Y[Ubhc'']b'AccX`YŁ
	K YV	FYZYf'hc'AccX'Y
	Hi hcf]U`	FYZYfhc`AccX`Y"
K YY_" ."&"A UfVX"!"* A UfVX	@YWhi fY	5b[`Yg'UbX'ghfi WhifY.'h\Y'WcfY'cZaYX]U ghcfmhY``]b["
		FYei]fYX'FYUX]b[
		FYUX]b['fll: 'HYI lvcc '7 \Udlyf''%) ž''Gi V!YX]hjb[ž bYk g``Ub[i U[Y`UbX`Wcbj Ybhjcb'''
		FYUX]b[`f&L`K\]hYžDYhYf"&\$%&"`fK ca Ub`6]hYg 7 cd.`h\Y``]ZY`UbX`h]a Yg`cZh\Y`\UfX`bYk g`fYdcfhfi I bdi V`]g\YX`7 ci fgY`BchYgž'I BGK "`fJ c`hc "@Y[Ubhc"`]b`A ccX`YL
		CdhjcbU`FYUX]b[
		@UWYmžA '&\$% ''fK UHW\'Mci f'@UdY`gžH\YgY'; fYUh @YXYg'UfY'7ca]b[':cfH\Yafi@W Kad] F[_Weł>Ubi Ufm'%)"'flc'hc'"@Y[Ubhc"']b'AccX`YŁ
	KYV	FYZYf'hc'AccX`Y"
	Hi hcf]U`	FYZYf'hc'AccX`Y
K_YY'(_'- 'A UfVX'!'% A UfVX	@YVVni fY	<pre>< YmDfYghc * 5 Xj Yfh]g]b[. 'h\ Y a U[]W</pre>
		H\]g`]g`U`[i Ygh`YWi fY`k]h\`8f`B]W_`F]W\Ufgcb"`8f F]W\UfXgcb`hYUW\Yg`UXj Yffdg]b[`]b`h\Y`a YX]U dfc[fUa`UbX`]g`U`\][\`mYI dYf]YbWYX`UXj Yffdg]b[UbX`Wcaaib]WUdcb`WfYUdj Y`UbX`ghfUhY[]ghz`Ug`k Y`` Ug`Ub`YI WY``Ybh`YWi fYf"`8cbffia]gg`]n
		FYei]fYX'FYUX]b['
		K ccXgžB]Wc`U"'f&\$\$*Ł8YgWf]V]b['X]gWci fgY.'U dfUWf]WU`[i]XY'hc'X]gWci fgY'UbU`mg]g"'@cbXcb. <cxxyf'5fbc`x"'o'\udhyf'%cb`m'f7 "@y[ubhc"']b'a="" c'hc="" ca="" ccx`ył"<="" fgy'cz5xj="" h\y'8]gwci="" qfl="" td="" y'ubx'[yh]h="" yfh]g]b[fiidd%()=""></cxxyf'5fbc`x"'o'\udhyf'%cb`m'f7>
		Cdh]cbU`FYUX]b[
		5 i ghYbžGʻUbXʻBYk a UbžBʻf&\$%) Ł'f5hhjhi XYgʻhc GdcbgcfYXʻUbXʻ6fUbXʻ7 cbhYbhfi8][]hU``BYk g

			a YX]U'j]fU`]mfžDgmWkc`c[m/ 'A Uf_Yf]b[ž'Jc`''') ž b"%\$ž'dd"+%)!+&*
		K YV	FYZYfhc A ccXY
		Hi ht[]U`	FYZYf'hc'AccX`Y
	K_YY_`, .`*`5df]``!`%\$`5df]`		K \cža Y3`A YX]U`Yh\]WgžZfYY`gdYYW\žUbX [YbYfU``mVY\Uj]b[`fUbX`VY]b[`HfYUhYXŁUg`U fYUgcbUV`Y`W]h]nYb"
			FYei]fYX'FYUX]b[
			FYUX]b['fl½ 'HYI lVcc_ž7\UdhYf'%+''9h\]\\g']b 7 ca a i b]\Whjcb'
/UX]b[f%Ł'HYI Wcc_ž7\UdhYf'%+	''9 h\]Wg`]b	F YUX]b['f&Ł 'C bY 'cf'Vch\ 'cZh\Y 'Zc``ck]b['f[c 'hc "@Y[Ubhc"']b 'A ccX`YŁ
			,

FYgci fWyg

DfYgWf]VYX F Ygci fWfg

Mci 'WUb'di fWXUgY'h\]g']b'Y]h\Yf'df]bhcf'X][]hU`Zcfa /h\Y'W\c]W']g'i d'hc'mci "'A U_Y'gi fY'mci 'Xc'di fWXUgY h\Y'' fX'YX]h]cbz'Ug'h\YfY'UfY'g][b]Z]WUbhX]ZZYfYbW'g'k]h\YUf]Yf'YX]h]cbz''GYWcbX`\UbX'Wcd]Yg'g\ci `X'VYUj U]`UV`Y"'H\Y'`]VfUfmg\ci `X'U`gc'\Uj Y'U'hYl h\cc_'cb'\][\'XYa UbX"'H\Y'`]VfUfmXcYg'\Uj Y'U'X][]hU``Wcdm Uj U]`UV`Y'Vi hh\YfY']q'U'ghf]Wf`]a]h'cb'\ck 'a i W\'mci 'WUb'Xck b`cUX'Zfca ']h'

: cf'h\cgY'cZmci ']b'DF/5Xj Yff]g]b['k \c'UfY'\cff]Z]YX'h\Uhlh\Y'Z]fghhYI h'Vcc_']g'a U]b`mUVci h'&i fbU']ga """" XcbffiVY"H\YgY']bXi ghf]Yg'UfY']bhf]WUhY`mW&bbYWfYXZ'UbX']b'h\]g'W&i fgY'k Y'k]``'VY'W&j Yf]b['__Ym ghcfmhY``]b['g_]``g'k \]W\UhlcbU``hc'U```W&a a i b]WUh]cb']bXi ghf]Ygž'YgdYW]U``mW&fY'W&bWYdhg'gi W\Ug'fbYk g'j U`i YgfiUbX'VUg]W[YbfYg'cZ'&i fbU`]ga 'UbX'DF "'Mci 'k]```Z]bX'h\]g'Vcc_'hc'VY'U'i gYZ ``fYgci fW'h\Uhmci 'fYh fb'hc'h\fci [\ci h'mci f'ghi X]Yg"

 $5XX]h]cbU``fYei]fYX`UbX`cdh]cbU``fYUX]b[g`k]```VY`dcghYX`cb`h\Y`WcifgY`AccX`Y`g]hY'''; c`hc`''@Y[Ubhc''']bh\Y`FYgcifWYg`gYW]cb/]h\Ug`U`[fYYb']f[gUk']Wcb''$

FYWca a YbXYX FYgci fWYg

Mci 'g\ci `X`\Uj Y`UWWgg`hc`U`l ? '#51 `X]WljcbUfmž`U`h\YgUi fi g`cf`hk cž`UbX`di bWi Uhjcb#ghm`Y`[i]XYg" Gca Y`fYWca a YbXUhjcbg`Zcf`h\YgY`k]```VY`di hcb`]bY"`H\YmWUb`VY`]b`df]bhcf`X][]hU``Zcfa ž'k \UhYj Yf`k cf_g VYghZcf`mci "`A U_Y`Zf]YbXg`k]h\`h\Ya`UbX`_bck `\ck 'h\Ymk cf_"

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Hi fb]h]b Gi Va]gg]cb

#mci YbWci bhYf'U'dfcV'Ya 'k \Yb'UthYa dr]b['rc'gi Va]hmci f'Ugg][ba Ybht\fci [\'Hi fb]r]bž'd'YUgY
hY'Yd\cbY'9I hYfbU'Gi ddcfhcb'-',) '''' %cf'Ya U]''h\Ya 'cb'YI hYfbU'hY'hgi ddcfh4 i bgk "YXi "Ui '"'Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY_YbXg'fl *) 'XUmg'U'mYUft'''#c'ici
UfY'i bUV'Y 'rc'gi Va]hmci f'Ugg][ba YbhXi Y'rc'U'ZJi 'hk]h\'Hi fb]r]b'mci 'a Um'Udd'mZcf'Ub'YI hYbg]cbž'Vi hmci
a i ghfYhJ]b'mci f'r]WYhbi a VYf'Zfca '9I hYfbU''Gi ddcfhfU'cb['k]h\'Ubmch\Yf'fY'Yj UbhXcW a Ybfgt'rc
]bWi XY'Ug'Yj]XYbWY 'rc'gi ddcfhmci f'YI hYbg]cb'Udd']WUh]cb'''#mci 'Ya U]''9I hYfbU''Gi ddcfhmci 'k]'`
Ui hca Uh]WJ''mfYWY]j Y'U'r]W_Yhbi a VYfž'Vi h]Zmci 'hY'Yd\cbY'mci 'k]'''bYYX'rc'gdYW]ZJWJ''mUg_'Zcf'cbY''
Hi fb]h]b'U'gc'dfcj]XYg'i dXUhYg'cb'h\Y]f'gmghYa 'gfUh' g'cb'Hk]hYf"

; YbYfU``mž'UggYgga YbhiHug_g'a i ghVY'gi Va]hhYX'Y`YVWfcb]\W)``mij]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh'' =b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk]``'VY'gHJhYX'cb'mci f'\\ci fgY'g'A ccX`Y'g]hY'k]h\ U`hYfbUh]j Y'gi Va]gg]cb'XYhJ]`g''

cfi]bZcfa Uh]cbicbi\ckihcigi Va]hUgg][ba Ybhgicbi]bYij]UiA ccXiY.i\hdg.#gh XYbh'i bgk "YXi "Ui #\ck! qi Va]hUgq][ba Ybha ccXiY

5 WUXYa]W<cbYghmUbX D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b['h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b['h\Ya `Ug`mci f`ck b"'=hWJb'hU_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b['hc`UWW]XYbhU`mWcdm]b['Zfca `U`gci fWY'k]h\ci hUW_bck `YX[Ya Ybh'

IBGK [fcidgdu[]uf]ga]bhch\YZc``ck]b[WuhY[cf]Yg.

7 cdm]b[.'i g]b['h\Y'gUa Y'cf'j Yfmg]a]`Uf'k cfXg'hc'h\Y'cf][]bU`hYl h'cf']XYU'k]h\ci h'UW_bck `YX[]b['h\Y gci fW'cf'i g]b['ei chUh]cb'a Uf_g"'H\]g'U`gc'Udd`]Yg'hc']a U[Ygž'Ufh'UbX'XYg][b'dfcYWgž'Ug'k Y``'Ug dfYgYbhUh]cbg'k\YfY'gca YcbY'dfYgYbhg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h'

=\uddfcdf]UhY 'dUfUd\fUg]b[.'7\Ub[]b['U'ZYk 'k cfXg'UbX'd\fUgYg'k \]'Y 'a cghmfYhJ]b]b['h\Y'cf][]bU`
ghfi Whi fY 'UbX#cf'dfc[fYgg]cb'cZ]XYUg'cZh\Y'cf][]bU`ž'UbX']bZcfa Uh]cb'k]h\ci h\UW_bck `YX[Ya Ybh''H\]g'U`gc
Udd`]Yg']b'dfYgYbhUh]cbg'k \YfY 'gca YcbY'dUfUd\fUgYg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h\UhYX]hUbX'hc
d]YW]b['hc[Yh\Yf'ei chYg'UbX'dUfUd\fUgYg']bhc'U'bYk 'k \c`Yž'k]h\ci h\Uddfcdf]UhY'fYZYfYbW]b["

7 c``i g]cb.'k cf_jb['k]h\ch\Yfg'Vi hdUgg]b['cZZh\Y'k cf_'Ug'U'dYfgcb'g']bX]j]Xi U``k cf_"'7 c``i g]cb'U`gc]bWi XYg'dfcj]X]b['mci f'k cf_'hc'Ubch\Yf'ghi XYbhVYZcfY'h\Y'Xi Y'XUhYžcf'Zcf'h\Y'di fdcgY'cZh\Ya d`U[]Uf]g]b['UhiUbmh]a Yž'dUm]b['Ubch\Yf'dYfgcb'hc'dYfZcfa 'Ub'UWUXYa]WhUg_ž'ghYU']b['cf'UWei]f]b[Ubch\Yf'dYfgcb'g'UWUXYa]Wk cf_'UbX'Wcdm]b[']hz'cZYf]b['hc'Wca d'YhY'Ubch\Yf'dYfgcb'g'k cf_'cf'gYY_]b[dUma YbhZcf'Wca d'Yh]b['UWUXYa]Wk cf_"

±bUddfcdf]UhY`W]hUh]cb.`7]h]b[`gcifWrg`k\]W\`\UjY`bchVYYb`fYUXžk]h\cihUW_bck`YX[]b[`h\Y`´gYWcbXUfm´gcifWrZfca`k\]W\`_bck`YX[Y`cZh\Ya`\Ug`VYYb`cVhU]bYX"

8 i d`]\W\n]cb`ffgY`Z\d`U[]\Uf]ga "Ł`gi Va]\n]b[`mci f`ck b`k cf_z`]b`k \c`Y`cf`]b`dUffz`k \YfY`]h\Ug`dfYj]ci g`m VYYb`dfYdUfYX`cf`gi Va]\nYX`Zcf`Ubch\Yf`UggYgga Ybhcf`\\cf\\text{i fgY`UhI_BGK_`cf`Ubch\Yf`i b]j Yfg]\m'

7 cffYWnfYZYfYbWlb['dfUWnWyg.

- DUfUd\fUg]b[žgi a a Uf]g]b[žYggUmk f]h]b['UbX h]a Y a UbU[Ya Ybh
- 5ddfcdf]UhY'i gY'cZUbX'Uhtf]Vi h]cb'Zcf'U'fUb[Y'cZa UhYf]U`g']bWi X]b['hYl hž']a U[Ygž'Zcfa i `UY'UbX WbWYdhg"

±0X]j]Xi U``Ugg]ghUbWr`]g`Uj U]`UV`Y`cb`fYei YghZfca `H\Y`@YUfb]b[`7 YbhY`f\hd.#k k k "`Wi bgk "YXi "Ui #£" Gh XYbhg`UfY`U`gc`fYa]bXYX`h\UhWUfYZ ``hja Y`a UbU[Ya Ybh]g`Ub`]a dcfhUbhdUfhcZgh XmUbX`cbY`cZh\Y]XYbh]Z]YX`WUi gYg`cZd`U[]Uf]ga `]g`dccf`hja Y`a UbU[Ya Ybh'`Gh XYbhg`g\ci `X`U``ck `gi Z]W]Ybh'hja Y`Zcf fYgYUfW\žXfUZh]b[`UbX`dfcdYf`fYZ/fYbW]b[`cZgci fWfg`]b`dfYdUf]b[`U``UggYgga Ybh']hYa g"

IBGK @]VfUfmU`gc`\Ugʻh\Y`9@G9`hcc``UjU]`UV`Y`hc`Ugg]ghmci`k]h\`mcif`ghiXmUhIBGK "'9@G9`]gXYg][bYX`hc`]bhfcXiVW`bYk`ghiXYbhg`hc`ghiXm]b[`UhIBGK`Vih]hWUb`U`gc`VY`U`[fYUhfYZfYg\Yf`Xif]b[`mcifqhiXm"

7 ca d'Yhlb['h\Y'9@&9'hi hcf]U`'UbX'ei]n'k]`'YbUV'Y'mci 'hc.

 UbU`mgY`hcd]\Mgž'd`Ub`fYgdcbgYg`UbX`cf[Ub]gY`fYgYUf\W\`Zcf'U\WXYa]\Wk f]hjb[`UbX`ch\Yf UggYgga YbhiHUg_g • i bXYfgHJbX'mci f'f][\hg'UbX'fYgdcbg]V]`]h]Yg'Ug'U'gh XYbh'Uhil BGK

5 WUXYa]W = b Zcfa Uh cb.

: cf`YggYbhJU``gh XYbh`]bZcfa UhJcb`fY`UhJb[hc.

- fYei Yghg Zcf Yl hYbg]cb/
- `UhY`gi Va]gg]cbg`[i]XY`]bYg/
- fYj]Yk 'cZa Uf_g/
- I BGK '< YU`h\ 'UbX'GUZYhmdc`]\\\Yg/
- YI Ua]bUhcb dfcWXi fYg/
- gdYWJU``Wcbg]XYfUhjcb`]b`h\Y`Yj YbhcZ]``bYgg`cf`a]gUXj Ybh fY/
- gh XYbhYei]lmUbX X]gUV]`]lm/
- UbX'ch\Yf'YggYbhJU`'UWUXYa]W]bZcfa UhJcbž'gYY

\hdg.#k k k "Uffg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWJXYa]W]bZcfa Uf]cb#dfchcWc`g![i]XY`]bYg#

.

⇒a U[Y'7fYX]h

H\Y'7YbhYbUfmFYZcfa Uhjcb'6fcUXg\YYh''>ci fbU']ga 3'5Xj Yfhjg]b[3'DF3

GC | F 7 9. K]_]a YX]U 7 ca a cbg" \hdg.##\called a cbg"k]_]a YX]U"cf[#k]_]#]Y.FYZcfa Uh]cbS\\bhYbUfm\S\fcUXg\YYh"\d[

7F = 7CG

7F = 7 C G 'Dfcj]XYf'7cXY. '\$\$\$-,;