

7ci fgY Cj Yfj]Yk

GHJZZ7cbHJWh8YHJ]`g

7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]lm	@cWUh]cb	D\cbY
?ifh8ci[`Ug	<u>"Xci [`Ug4 i bgk "YXi "Ui</u>	9a U]`']b]h]U``m	79) \$*	-',)')\$(*

GWXcc`7cbHJWh =bZcfa Uh]cb

<u>9b[]bYYf]b['Gh'XYbhGiddcfhGYfj]WYg'-</u>'H\Y'BiWYig'!'Ybfc`a Ybhž'dfc[fYgg]cb'W\YW_gž'WUg\'fYei Yghgž WtifgY']ggi Yg'cf'dfc[fUa!fY`UhYX'ei Yf]Yg'

9b[]bYYf]b['+bXi glf]U`'HfU]b]b['--'+bXi glf]U`'lfU]b]b['ei Ygl]cbg'

<u>I BGK "Gh Xm5VfcUX"</u>— gh XmUVfcUX gh XYbhYbei]f]Yg fZcf']bVci bX gh XYbhgŁ'

<u>I BGK '91 WXUb[Y</u>'-gh XYbhYl WXUb[Y'Ybei]f]Yg'flcf']bVci bX'gh XYbhgl'

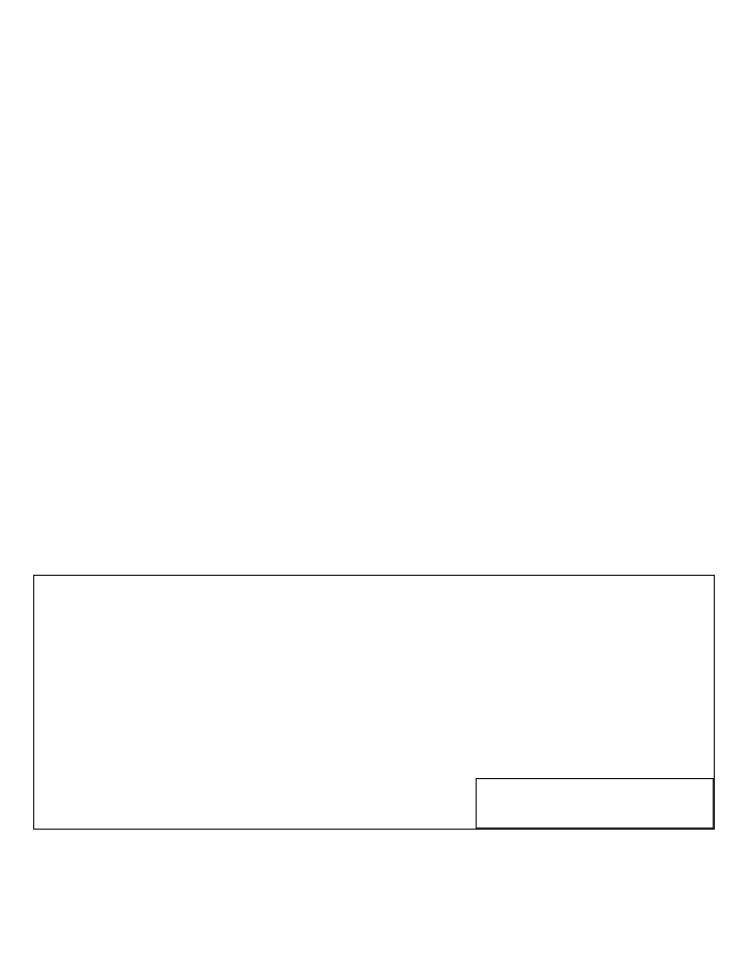
LBGK : i h fy Gh XYbh - dch bh U`gh XYbh Ybei]f]Yg Y"["UXa]gg]cbgž ZYYgž dfc[fUa gž WfYX]h lfUbgZYf

D/cbY.

fŽ*%'&Ł'-',) ',) \$\$'-Bi WYi g'Ghi XYbh<i V'

fŽ*%%&L'-',) '+**%'-'9b[]bYYf]b['=bXi ghf]U`'HfU]b]b['

fŽ*%%&£'-',) " %+- '-1 BGK 'Gh Xm5VfcUX'UbX'1 BGK '91 WXUb[Y'fZcf']bVci bX'gh XYbhg£'



5ggYgga Ybh

 $H\Y'Z\DU''[fUXY'Zcf'h\]g'WcifgY'k\]^``bcfa\ U``mVY'VUgYX'cb'h\Y'gi a `cZh\Y'gWcfYg'Zfca `YUW\`cZh\Y UggYgga YbhiHUg_g'''H\Y':]bU``9I Ua]bUh]cb']g'k cfh\') $i `cZh\Y':]bU``A Uf_']ZWUgg'k cf_']g']bWi XYX''UbX %$$i `]ZWUgg'k cf_']g'bch]bWi XYX'''H\Y'WUgg'k cf_']g'k cfh\') $i `cZh\Y':]bU``A Uf_']Z]bWi XYX'''5 `a Uf_'cZUh`YUgh'($i `]b'h\Y'Z]bU``YI Ua]bUh]cb']g'fYei]fYX'VYZcfY'h\Y'WUgg'k cf_']g']bWi XYX']b'h\Y'Z]bU``a Uf_'''H\Y Zcfa U``YI Ua 'gWf]dhg'k]``bchVY'fYhi fbYX'''Ghi XYbhg'k \c'dYfZcfa 'dccf'm]b'h\Y'UggYgga YbhiHUg_g'UbX k cf_g\cdg'UfY'fYWca a YbXYX'hc'X]gW gg'dfc[fYgg'k]h\'h\Y'`YWhi fYfXi f]b['h\Y'hYfa "'BchY.''H\Y'Wc! cfX]bUhcf'fYgYfj Yg'h\Y'f][\h'hc'UX^\ghh\Y'Z]bU``gWcfYg'VmgWU`]b[']ZU[fYYX'Vmh\Y'<YUX'cZGW\cc'''$

? 99D 5 7 C DMC: 5@@GI 6A +HH98 5GG = BA 9B HG#9L 5A G

D'YUgY'_YYd'U'WcdmcZk f]thYb'Ugg][ba Ybhg'f]b'WUgY'mci f'Ugg][ba Ybh]g'a]gd'UW'XŁ"

5ggYgga YbhhUg_	K Y][\h	8iY'8UHY	7 ci fgY @YUfb]b[Ci HWca Yg 5ggYggYX
%"'±blfc'FcW_'5gg][ba Ybh	&\$I	\$' #%\$#&\$&&`%%) - `DA	%ž'&ž''
&"'Hi bbY`'5gg][ba Ybh	' \$1	%\$#%#&\$&&`%%) - `DA	%ž'&ž'' ž'(
' "':]bU`'91 Ua) \$1	Bch5dd`]WUV`Y	%ž`&ž`'

5ggYgga Ybh% +bffc FcW_5gg][ba Ybh

GhUfh:XUhY. '&&#\$-#&\$&&'\$).\$\$'DA

Gi Va]gg]cb bchYg. Gi Va]hY`YWfcb]WU``mj]U'h\Y'Wci fgY`A ccX`Y'dU[Y"

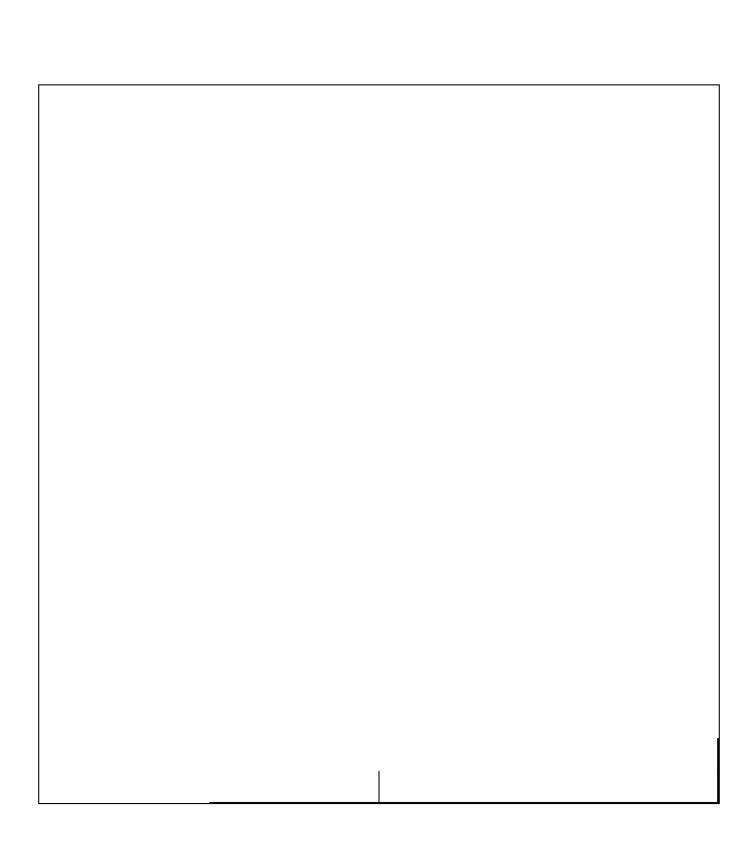
"**\$'#%\$#&\$&i&Y%XUJhY**..**D\$**A#%\$#&\$&&*%%)-"DA

AUf_g: AUf_g:fYhifbY% "K]h\]b:hkc:kYY_g:k\YfY:dcgg]V`Y"

'h\fc

<i fX`Y`fYei]fYa Ybh

5 'a Uf_'cZUh``YUgh'(\$i ']b'h\Y'Z]bU``YI Ua]bUh]cb']g'fYei]fYX'VYZcfY'h\Y'WUgg'k cf_']g']bWi XYX']b'h\Y'Z]bU` a Uf_"



FYgci fWyg

DfYgWf]VYX F Ygci fWYg

 $\label{thm:linear} $$HY''H'I'' g'Zcf''h g'Zcf''h g'Yz''5XX]h]cbU``fYZ'fYbW'g''h Uh a Um'VY''i gYZ\```k]```U`gc''VY''dfcj]XYX''' $$$

FYWca a YbXYX FYgci fW/g

HYI hg#6cc_g#DUdYfg

⊋mci 'k ci 'X``]_Y 'hc'di fW\UgY'U'Vcc_'Zcf'Z fh\Yf'dfY'cf'dcghi bXYfghUbX]b[žh\Y'Zc``ck]b[']g'fYWca a YbXYX.

6fUXmUbX'6fck b'f&\$\$(ŁFcW_'A YWXUb]Wg'Zcfi bXYf[fci bX'A]b]b['fl fX'YX]h]cbŁZ'Gdf]b[Yf'JYf'U[ž'\66B. %(\$&\$&\$*(' '\G_j U]'UV'Y'\Zfca 'h\Y' | BGK '6cc_g\cd'Zcf'Uddfcl]a UhY'm' \%\$) Q\@!\Vcc_'5j U]'UV'Y'Cb`]bY h\fci [\``]\VfUfmQ

Ch\Yf'hYI hgžmci a Um'VY]bhYfYghYX]b.

<cY_ž'9"'f&\$\$+L'DfUWfJWD``FcW_'9b[]bYYf]b["': F99'8CK B@C58. \mdg.#kkk"fcWgWJYbWY"Wca#YUfb]b[#\cY_!g!WcfbYf

 $K m`]Yž8"7"`UbX`A Už7"K "'f&$$(ŁFcW_'G`cdY'9b[]bYYf]b[ž'(h\`9X]h]cb"`Gdcb'DfYgg.BYK'Mcf_"'BChY. Wcbh]bi Yg'<cY_ž'9"`UbX`6fUmž'9"K "'f%-, %ŁFcW_'G`cdY'9b[]bYYf]b[ž' fX'9X]h]cb"'H\Y'=bgh]hi hY'cZA]b]b[UbX`A YhU``i f[mž'@cbXcb"Q9!Vcc_'5jU]`UVY'Cb`]bY'h\fci [\`]VfUfmQ$

 $< cY_9"`UbX`6fck\ b`9"H"`f\%~,\ \&\&l\ bXYf[\ fci\ bX`9l\ WUj\ Uf]cb`]b`F\ cW_ž'H\Y`=bgf]fi\ f]cb`cZA\]b]b[``UbX`A\ YfU``i\ f[\ mž`@cbXcb"$

< cY_ž'9"ž'? U]gYfž'D"? "'UbX'6Uk XYbž'K ": "'f% -) Ł'Gi ddcfhcZI bXYf[fci bX'9I WUj Uh]cbg']b' < UfX'F cW_"

<i Xgcbz̆->"5"'UbX´<Uff]gcbz̆->"D"'f&\$\$) Ł'9b[]bYYf]b['F cW_A YWWUb]Wg"'' fX´=a dfYgg]cb"'DYfa U[cb"'③! Vcc_'5j U]`UV`Y`Cb`]bY`h\fci [\``]VfUfmQ

Gc.Zhk UfY

Mci 'Ufy'fyei]fyx'hc'i gy'DaUeU[W UWgcZk Ufy'hc'Wta d'Yhy'h\]g'Wti fgy"'Mci 'WUb'UWWgg'h\y'gcZk Ufy'Zcf h\y'di fdcgyg'cZh\]g'Wti fgy'j]U.'3UUWte 3`kf_ W3`ki ZWtW \hdg.#k k k "a mUWWgg"i bgk "YXi "Ui #Udd`]WUhcbg#cWgWJybWY!gi]hy

7 ci fqY '9j U'i Uhcb 'UbX '8 Yj Y'cda Ybh

K Y'Wcbh]bi Y'hc'hfm'UbX']a dfcj Y'h\Y'Wci fgY'UbX'j U'i Y'ghi XYbhZYYXVUW_": YY`'ZFYY'hc'Ya U]`'8f'?i fh 8ci [`Ug'Xi f]b['h\Y'Wci fgY'Zcf']a a YX]UhY'Wcbg]XYfUh]cb"'K Y'k]``'U'gc'i bXYfhu_Y'U'Zcfa U`'I BGK 'ghi XYbh gi fi YmUh'h\Y'YbX'cZHYfa "

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

 $\label{eq:continuous} D`YUgY`fYZYf`hc`h\Y`A~ccX`Y`dU[~Y`cZh\Y`Wci~fgY`Zcf`Z~fh\Yf`[~i~]XUbWY`cb`UggYgga~Ybh'gi~Va~]gg]cb"$

I BGK '\Ug'U'gHJbXUfX'`Ufg'U V'A Ug U 'Y' h'HUg_g

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

6Yk UfY "5b" Ugg][ba Ybhh\Uh]bWi XYg"d`U[]Uf]gYX"a UhYf]U``k]```fYWY]j Y"U"\$ı ': U]`žUbX`ghi XYbhg`k \cd"\U[]Uf]gY\"a UmZU]``h\Y'Wci fgY"'Ghi XYbhg`k \cd"\U[]Uf]gY\"UfY\"U`gc"`]UV`Y'hc"X]gW]d`]bUfm'UWf]cbž]bWi X]b[YI Wi g]cb'Zfca 'Ybfc`a Ybh'

 $D`U[]Uf]ga ~]g'hY'i gY'cZUbch\Yf'dYfgcb'g'k cf_'cf']XYUg'Ug']Zh\Ymk YfY'mci f'ck b'''K ~Yb']h]g'bYWYggUfmcf XYg]fUV'Y'hc'i gY'ch\Yf'dYcd'Y'g'a UhYf]U`'mci 'g\ci `X'UXYei UhY`mUW_bck `YX[Y'k \cgY'k cfXg'cf']XYUg'h\Ym$