

7ci fgY Cj Yfj]Yk

GHJZZ7cbHJWh8YHJ]`g

7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]hm	@cWUh]cb	D\cbY
8]j mU'BU]f	X]j mU"bU]f4 i bgk "YXi "Ui	Hi YgXUm&!*da ž K YXbYgXUm &!*da	F cca '%\$' ž @Yj Y``%ž' < &\$	fĚ*%&Ł -\$*) (,*%

GWXcc`7cbHJWh = DZcfa Uhlcb

<u>9b[]bYYf]b[:'Gh: XYbh'Gi ddcfh'GYfj]WYg'-</u>'H\Y'Bi WYi g'! 'Ybfc`a Ybhž'dfc[fYgg]cb'W\YW_gž'WUg\'fYei Yghgž Wci fqY']qqi Yg'cf'dfc[fUa!fY`UhYX'ei Yf]Yq'

9b[]bYYf]b[*\DXi glf]U``HfU]b]b[-- *\DXi glf]U``lfU]b]b['ei Ygl]cbg'

LBGK Gh Xm5VfcUX - gh XmUVfcUX gh XYbhYbei]f]Yg flcf]bVci bX gh XYbhgŁ

I BGK '91 WXUb[Y'-ghi XYbhYl WXUb[Y'Ybei]f]Yg'flcf']bVci bX'ghi XYbhgŁ'

LBGK : i h fy Gh XYbhg - 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 Gh XYbh<i V

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

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

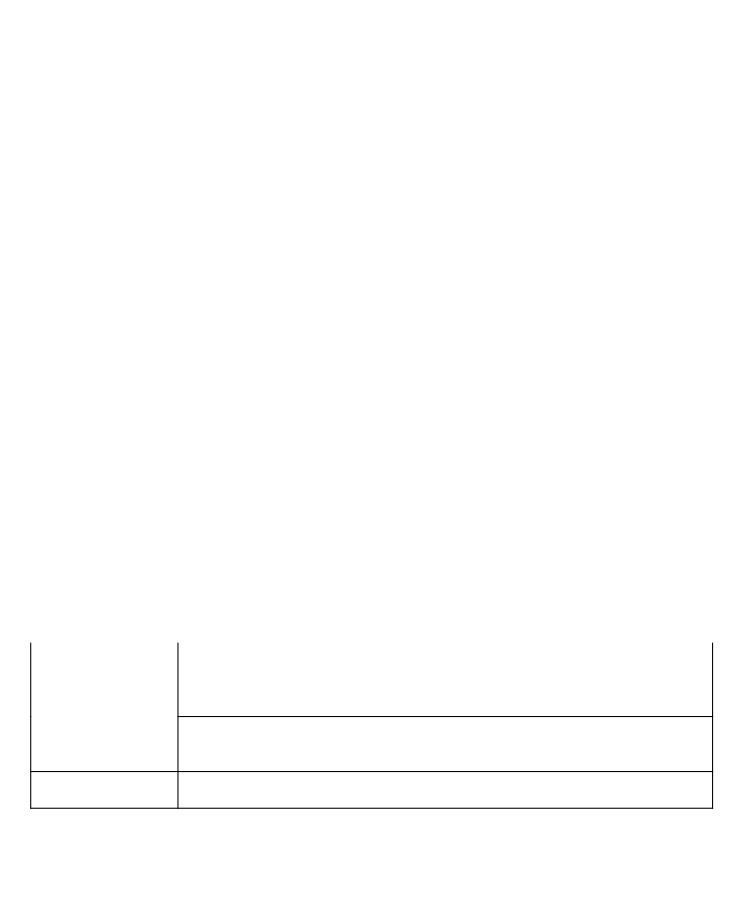
7ci fgY 8YW] g

I b]hg cZ7fYX]h * *

Gi a a UfmcZh\Y 7ci fgY

H\Y'Z|fghighfUbX'cZh\Y'Wci fgY'Wcj Yfg'h\Y'Z|fghi) 'k YY_g'cZh\Y'gYgg]cb"''H\]g'gYWjcb'cZh\Y'Wci fgY']g WcbWfbYX'k]h\'h\Y'UbU'mg]gz'XYg][bz'UbX'Yj U'i Uh]cb'cZhfUZ]WUbX'bYk cf_'gmghYa gz']bWi X]b['h\Y'VUg]Wg cZhfUZ]WZck 'h\Ycfm'UbX'h\Y'ghYdg'cZh\Y'fY[]cbU'`hfUbgdcfhUh]cb'd'Ubb]b['dfcWygg"'H\Y'YWhi fYg'UbX k cf_g\cdg'k]``'dfcj]XY'Ub'cddcfhi b]mhc "YUfb'h\Y'Yb[]bYYf]b['dfcdYfh]Yg'cZhfUZ]WghfYUa g'U'cb['k]h\ fY`Yj Ubha YUgi fYa YbhUbX'bYk cf_'UbU'mg]g'hYW\b]ei Yg"

H\Y`U]a `cZh\Y`gYWbX`glfUbX`]g`hc`[]j Y`ghi XYbhg`U`Vf]YZcj Yfj]Yk `cZh\Y`[Yca Ylf]WXYg][b`cZF i fU` <][\k Umg`UbX`F cUXgžk \]W\`k]```VY`Wcj YfYX`]b`k YY_g`*!%\$"`F cUX`XYg][b`]g`i gi U``mi bXYfhU_Yb`Vm



5ggYgga Ybh

Ghi XYbhgʻk \c'a]ggʻh\YʻUggYgga YbhgʻUgʻUʻfYgi `hcZ]``bYggʻcfʻi bZcfYgYYbʻWJfW a ghUbWfgʻa i ghiUdd`mZcf gdYWJUʻʻWcbg]XYfUhJcbgʻh\fci [\'\hdg.#ghi XYbh'i bgk "YXi "Ui #gdYWJUʻ!Wcbg]XYfUhJcbʻUbXʻWcbhUWhh\YʻWci fgY!WccfX]bUhcf"

 $Ghi XYbhg'k \c'dYfZcfa'dccfm']b'h\Y'Ugg][ba Ybh'UbX'k cf_g\cdg'UfY'fYWcaa YbXYX'hc'X]gW gg'dfc[fYgg k]h\'h\Y''YWhi fYf'Xi f]b['h\Y'hYfa'''H\Y''YWhi fYf'fYgYf] Yg'h\Y'f][\hhc'UX^ghh\Y'Z]bU''gWcfYg'VmgWU']b[']Z U[fYYX'hc'Vmh\Y'<YUX'cZGW.cc'''$

H\Y'dUgg'a Uf_']b'h\]g'Wci fgY']g')\$\ 'cj YfU``\ž'\ck Yj Yf\zgh XYbhg'a i ghgWcfY'Uh``YUgh'(\\ _']b'h\Y Z]bU``YI Ua]bUh]cb']b'cfXYf'hc'ei U`]Zm\Zcf'U'DUgg']b'h\]g'Wci fgY''\=\Z'VY`ck 'U'(\\ _']g'g\CfYX'cb'h\Y :]bU``9I Ua \zh\Y'\Z]bU``YI Ua 'a Uf_k\]```fYd`U\W'mci f'\\circ i fgY'a Uf_"

5ggYgga Ybh'tUg_	K Y][\h	8iY'8UHY	7 ci fgY @YUfb]b[Ci hWca Yg 5ggYggYX
%"·A ccX`Y·Ei]n)	%*#\$*#&\$&&`\$*.\$\$`DA	%ž'&ž'' ž'(
&"'A]X!HYfa '91 Ua	&) ı	&- #\$* #&\$&&`\$) .\$\$`DA	%ž'&ž'' ž'(

 $\label{thm:condition} $$YI dYWYX`YUfb]b['ci Waa Ygž'dfYdUfY'gh XYbhg'Zcf'h\Y'Z]bU`YI Ua ž'UbX'X]gWci fU[Y``Ugha]bi hY'WfUa a]b[''H\Y'YI Ua 'k]``VY'UggYggYX'cb'hYWb]WU``UWW fUWh'$

5XX]h]cbU``XYHJ]`g

GYY'AccX`Y'Zcf'XYHJ]`g

5ggYgga Ybh' . <][\k Um; Yca Yhf]W8Yg][b

GhUfh:XUhY. "% #\$ + #&\$ & & "\$(. \$\$ "DA

Gi Va]gg]cb bch/g. @Uh/ gi Va]gg]cbg k]``UhhfUWhdYbU'h]Yg"

8i Y`XUhY.`\$) #\$, #&\$&&`\$(`.\$\$`DA A Uf_g`fYhi fbYX.``% h\`5i [i gh

H\]g``Ugg][ba Ybhik]```VY`VUgYX`cb`h\Y`hcd]\Wg``Wcj YfYX`]b`K YY_g`+`hc`\%\$``YWfi fYg``UbX`k cf_g\cdg"`H\Y Ugg][ba YbhihYghg`U`ghi XYbhg`i bXYfghUbX]b[`cZXYg][b]b[`X]ZZYfYbhY`Ya Ybhg`cZU`fcUXk Um]b`UWWcfXUbW\ k]h\`h\Y`5i ghfcUXg`XYg][b`a Ubi U`"`H\Y`YI dYWhYX`ci h\cdot Y`cZh\]g``Ugg][ba Ybhi]g`hc`dfYdUfY`ghi XYbhg`Zcf h\Y`Z]bU``YI Ua `UbX`X]g\\cdot ifU[Y``Ughia]bi hY`\WfUa a]b["`H\Y`ei Ygh]cbg`k]```VY`a Uf_YX`VUgYX`cb a Yh\cXc`c[]\WJ``U\\Wf fU\\m'

H\Y'Ugg][ba Ybhk]``VY'a UXY'Uj U]`Ubi h

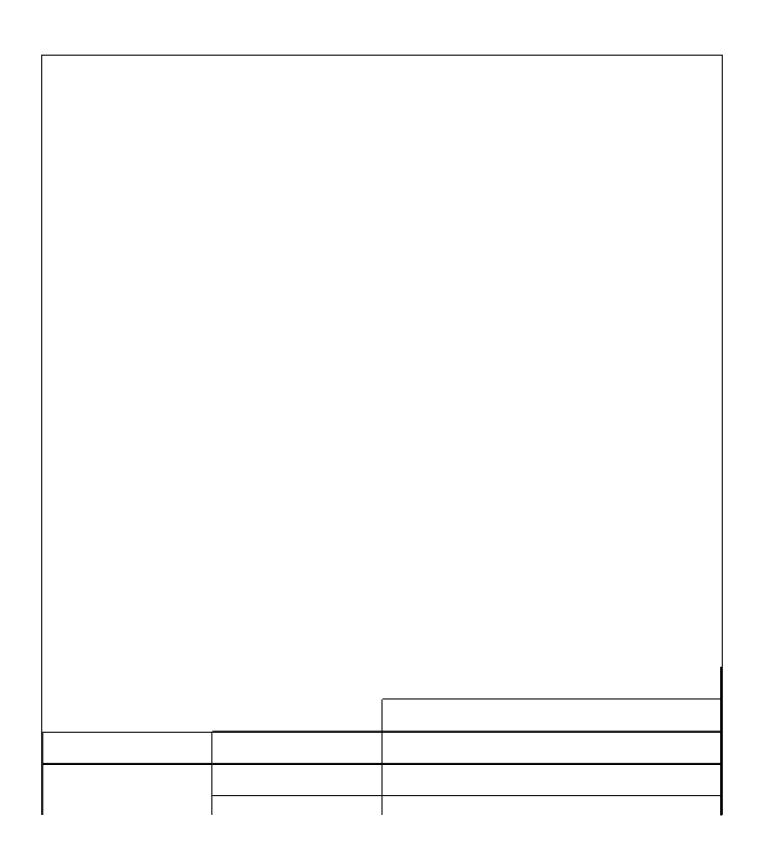
ı

‰

XYbh

Ya a]ba Yb]gg][

‰



FYgci fWyg

DfYgWf]VYX F Ygci fWYg

 $5\ ``fYei\]fYX\#fYWc a\ a\ YbXYX`fYUX]b[\ `k\]```VY`dfcj\]XYX`cb`A\ ccX`Y`cf`Uj\ U]`UV`Y`]b`fh\Y``]VfUfm$

• 7 cd]Yg'cZWUgg'bchYg'UfY'Uj U]`UV`Y'Uhih\Y'A ccX`Y'g]hY'Zcf'h\]g'Wci fgY. '

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

D`YUgY`fYZYf`hc`h\Y`A ccX`Y`dU[Y`cZh\Y`Wci fgY`Zcf`Z fh\Yf`[i]XUbW\`cb`UggYgga Ybhigi Va]gg]cb"

I BGK `\Ug`U`ghUbXUfX``UhY`gi Va]gg]cb`dYbU`hmcZ

•)ı 'dYf'XUmž'Zcf'U``'UggYgga Ybhg'k \YfY'U'dYbU'hm'Udd`]Ygž'WUddYX'Uh'Zjj Y'XUmg'f1%&\$`\ci fg\z'UZhYf k\]WX'U'ghi XYbh\WUbbchgi Va]h'Ub'UggYgga Ybhž'UbX'bc'dYfa]hhYX'j Uf]Uh]cb"

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'

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

5ddYbX]I . '9b[]bYYfg'5i ghfU`]U'f95Ł'DfcZYgg]cbU` '9b[]bYYf'7ca dYhYbWm GHJbXUfX

Dfc[fUa '±bHYbXYX'@YUfb]b['CiHWca Yg	
?bck `YX[Y`UbX`g_]```VUgY	
D9%'%'7 ca dfY\Ybg]j Yž'h\YcfmVUgYX'i bXYfghUbX]b['cZh\Y'i bXYfd]bb]b['bUhi fU`'UbX d\mg]\WJ`'g\NJYb\W'g'UbX'h\Y'Yb[]bYYf]b['Z bXUa YbhJ`g'Udd`]\WJV`Y'hc'h\Y'Yb[]bYYf]b['X]g\NJd`]bY	
D9%"&"7 cbWYdh U``i bXYfgHJbX]b['cZh\Y'a Uh\Ya Uh]Wgžbi a Yf]WJ``UbU`mg]gžgHJh]gh]Wgž'UbX Wca di hYf'UbX']bZcfa Uh]cb'gW]YbWYg'k\]W\'i bXYfd]b'h\Y'Yb[]bYYf]b['X]gW]d`]bY	
D9%" '±0!XYdh\'i bXYfghUbX]b['cZgdYW]U`]ghVcX]Yg'cZ_bck 'YX[Y'k]h\]b'h\Y'Yb[]bYYf]b[X]gW]d`]bY	
D9%"('8]gWfba YbhcZ_bck `YX[Y`XYj Y`cda YbhUbX`fYgYUfW\`X]fYWf]cbg`k]h\]b`h\Y Yb[]bYYf]b['X]gWJd`]bY	
D9%') '? bck `YX[Y`cZYb[]bYYf]b['XYg][b`dfUWf]WY`UbX`WcbhYl hi U``ZUWcfg`]a dUWf]b['h\Y Yb[]bYYf]b['X]gW]d`]bY	
D9%"* `I bXYfgHJbX]b[`cZh\Y`gWcdYž'df]bW]d`Ygž'bcfa gž'UWWci bHJV]`]h]Yg`UbX`Vci bXg`cZ gi gHJ]bUV`Y`Yb[]bYYf]b[`dfUW]WY`]b`h\Y`gdYW]Z]WX]gW]d`]bY	
9b[]bYYf]b['Udd`]WUr]cb'UV]`]hm	
D9&"%5dd`]WUh]cb`cZYghUV`]g\YX`Yb[]bYYf]b[`a Yh\cXg`hc`Wca d`Yl `Yb[]bYYf]b[`dfcV`Ya gc`j]b[
D9&"&": `i Ybh'Udd`]WUh]cb'cZYb[]bYYf]b['hYW\b]ei Ygž'hcc`g'UbX'fYgci fWfg	
D9&"' '5dd`]WUhjcb'cZgmghYa UhjWYb[]bYYf]b['gmbh\Yg]g'UbX'XYg][b'dfcWYggYg	
D9&"('5dd`]WUh]cb`cZgmghYa Uh]WUddfcUWXYg`hc`h\Y`WcbXi WhUbX`a UbU[Ya YbhcZYb[]bYYf]b[dfc^YWhg	
DfcZYgg]cbU``UbX`dYfgcbU``Ullff]Vi lYg	
D9' "%'9h\]WU`'W&bXi Wh'UbX'dfcZYgg]cbU`'UWW&i bHUV]`]hm	
D9' "&"9ZZYWNjj Y"cfU``UbX'k f]rhYb"Wca a i b]WUrjcb"]b"dfcZYgg]cbU``UbX'`UmXca U]bg	
D9' "' '7 fYUhjj Yž']bbcj Uhjj Y'UbX'dfc!UWhj Y'XYa YUbci f	
D9' "('DfcZYgg]cbU`i gY'UbX'a UbU[Ya YbhcZ]bZcfa Uh]cb	
D9' ") 'C fXYf`m'a UbU[Ya YbhcZgY`ZïUbX`dfcZYgg]cbU``WcbXi Wh	
D9' "* '9ZZYW¶j Y'HYUa 'a Ya VYfg\]d'UbX'HYUa '`YUXYfg\]d	