7ci fgY'Cj Yfj]Yk

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

'7cbj Ybcfg'

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
HYa U'A]`ghY]b		9aU]`WcbhJWh dfYZYffYX"AYYh]b[g VmUddc]bhaYbh	A cfj Yb 6fck b 6i]`X]b[" A 6' *(

"@YWhi fYfg"

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
>c\b'7Uff	<u> </u>	Uddc]bha Ybh	A cfj Yb 6fck b 6i]'X]b[" A 6' *'	

GWXcc`7cbHJWh′±bZcfa Uh]cb

 $\label{eq:GWCCccZ} $$GW.cc``cZ<$ia~Ub]$$fYg`UbX`@Ub[i~U[~Yg$

@c\\U|rgcb. G\\\cc``C\Z]\\\\ž'A\cfj\Yb'6fck\b'6i]\X]b[\z'@\j\Y`'&z\&),

CdYb]b['< ci fg. 'A cbXUm! ': f]XUmž'- Ua '!') da

D\cbY.'Ž*%'&'-',)'%*,%

: UI . Ž*%'&'-',)', +\$)

9a U]`. \<u>U`4 i bgk "YXi "Ui</u>

7ci fgY 8YHJ] g

7 fYX]hDc]bhg***

Gi a a UfmcZh\Y 7ci fgY

H\Y`gcWjU``gWjYbWYg`d`UmUb`]bhY[fU``fc`Y`]b`Wca dfY\Ybg]j Y`Ybj]fcba YbHU``a UbU[Ya Ybhž'UbX`t\Y]f
]a dcfhUbWY`\Ug`VYYb`fYWc[b]gYX`]b`fYWYbhmYUfg"`H\]g`Wci fgY`Yl d`U]bg`t\Y`gcWjU`ždc`]hJWU``UbX`\]ghcf]WU`
WcbhYl hg`cZcf[Ub]gUhJcbU``UbX`t\YcfYhJWU``ZfUa Yk cf_g`k]h\]b`k\]W\`Ybj]fcba YbhU``]ggi Yg`UfY`]bhYfdfYhYX UbX`\

5ggYgga Ybh

5 hm/b XUb WY F Yei]fYa Ybhg

 $\hbox{Ghi XYbhg'UfY'ghfcb[`mYbWci fU[YX'hc'UhhYbX'U```WUggYg'UbX'fYj]Yk ``YWhi fY'fYWcfX]b[g''] }$

7ci fgY GWX YXi `Y

J]Yk 'WUgg'hja YhUV'Y

H]a YtUV`Y

8 UhY	HmdY	7cbh/bh
K YY_'%'%': YVfi Ufm!'&(: YVfi Ufm	6 YbXYX	→ hfcXi Wh]cb. h\Y gWcdY cZh\Y Ufhgž\i a Ub]hJYg UbX gcWJU gWJYbW g/UbX h\Y]f fY`UhJcbg\]d k]h\ Ybj]fcba YbhU a UbU[Ya Ybh'
		AcXi `Y`%Wca a YbWYg. '<]ghcfmž\i a Ub`[Yc[fUd\mž UbX`h\Y`Ybj]fcba Ybh
		: cf`h\]g`k YY_'UbX`U```Zc``ck]b[`k YY_gža cfY`XYhU]` cb`hcd]\\gžhUg_gžUgg][ba YbhgžfYUX]b[g`YhWUfY \\cbhU]bYX`]b`mci f`A ccX`Y`g]h\"
K YY_`&.`&) ': YVfi Ufm!'' A UfWX	6`YbXYX	AcXi `Y`%Wcbhjbi YX. <]ghcfmž\iaUb`[Yc[fUd\mžUbX`h\Y`Ybj]fcbaYbh
K YY_" . ("A UfVX ! "%\$ A UfVX	6`YbXYX	A cXi `Y`&'Wca a YbWYg. '9bj]fcba YbHJ``Yh\]Wg`UbX d\]`cgcd\m
K YY_^(.^%%A UfWX^!^%+ A UfWX	6`YbXYX	A cXi `Y`&`Wcbh]bi YX. '9bj]fcba YbhU``Yh\]Wg`UbX d\]`cgcd\m
K YY_")."% "A UfWX"!"&(A UfWX	6`YbXYX	A cXi `Y'' . 7 i `hi fU``UddfcUWXYg`hc`Ybj]fcba Ybh'UbX Ybj]fcba YbhU`]ga . h\Y'j]Yk Zfca `Ubh\fcdc`c[mUbX gcWjc`c[m
K YY_'*.'&) 'A UfW\'!'' % A UfW\	6 YbXYX	A cXi `Y'' `Wcbhjbi YX. '7 i `hi fU``UddfcUWXYg'hc Ybj]fcba Ybh'UbX'Ybj]fcba YbhU`]ga . 'h\Y'j]Yk 'Zfca Ubh\fcdc`c[m'UbX'gcWjc`c[m
K YY_'+.'%'5df]`'!'+'5df]`	6`YbXYX	A cXi `Y`(.'9bj]fcba YbHJ``Wcblfcj YfgmUbX _bck `YX[Y`Wcbglfi Wf]cb.'h\Y`Z]Y`X'cZgW]YbWY'UbX lYW\bc`c[mghi X]Yg
K YY_', .', '5df]`'!'%('5df]`	6 YbXYX	A cXi `Y`(`Wcbh]bi YX. `9bj]fcba YbhU``Wcblfcj Yfgm UbX`_bck `YX[Y`Wcbglfi Wf]cb. 'h\Y`Z]Y`X`cZgW]YbW UbX`hYW\bc`c[mighi X]Yg
K YY_''%)	6`YbXYX	AcXi `Y`). `GcWjU``gWjYbWfž'dc`]WniUbX`dc`]rjWg/UbXdUfrjWjdUhcfmUddfcUWXYg
K_YY_`%\$.`&&`5df]``!`&, 5df]`	6`YbXYX	A cXi `Y`) `Wcbh]bi YX

FYgci fWyg

DfYgWf]VYX F Ygci fWYg

 $\begin{tabular}{ll} $$McifgYhfYUX]b[g'UfY']ghYX'UbX'UWWgg]V'Y'j]U'hY'WcifgY'@9; 5BHC'g]hY''GYY'hY'WcifgY'AccX'Y'g]hY'ZcfXYhU]'g''HY'gYhfYUX]b[g'k]``Zcfa'hY'VUg]g'cZmcif'kYY_`mfYUX]b[g'aaUf]Yg'' \end{tabular}$

FYWca a YbXYX FYgci fWyg

Mci f'UXX]h]cbu``fYWca a YbXYX`fYUX]b[g`UfY``]ghYX`UbX`UVWYgg]V`Y`j]U`h\Y`Wci fgY`@9; 5BHC `g]hY"`GYY`h\Y Wci fgY`A ccX`Y`g]hY`Zcf`XYhU]`g"`Mci `UfY`YI dYWYX`hc`a U_Y`[ccX`i gY`cZh\Y`fYUX]b[g`dfcj]XYX`Zcf`h\Y Wci fgYž`UbX`hc`fYUX`a cfY`k]XY`mZcf`mci f`]bXYdYbXYbhfYgYUfW\"

7ci fgY 9j U'i Uhjcb UbX 8Yj Y'cda Ybh

±0'U```Wci fgYg'Zcf'h\Y'A UghYf'cZ9j]fcba YbhU``A UbU[Ya Ybhz'dUghYl dYf]YbWY'UbX'ghi XYbhZYXXVUW_`\Ug]bX]WUhYX'h\Y'j U`i Y'cZ]bXYdYbXYbhfYgYUfW\'UbX'dUfh]W]dUhcfmWUggfcca 'UddfcUW\Yg''K Y'UfY'XYj Y`cd]b[h\Y'i gY'cZcb!`]bY'fYgci fWYg'UbX'Yl d`cf]b['VYhYf'k Umg'hc'i gY'cb!`]bY'X]gW gg]cb'Zcfi a g''

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"'=hWUb`hU_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b['hc`UWW]XYbhU``mWcdm]b['Zfca `U`gci fW'k]h\ci hUW_bck `YX[Ya Ybh'

 $I BGK `[fci dg'd`U[]Uf]ga `]bhc'h\Y'Zc``ck]b[`WUhY[cf]Yg.$

 $7 \text{ cdm}b[...i g]b[...h\Y.gUa Y.cf.j Yfmig]a] \Uf'k cfXg'hc'h\Y.cf][]bU''hYl h'cf']XYU'k]h\ci h'U\V_bck `YX[]b[...h\Y.cf][]bU''hYl h'cf']XYU'k]h'cf']$