=bXccf'D]W_`YVU```HU_Yg'DU`a '6YUW 7ci bhm'Vm'Ghcfa 'H\]g'Gi a a Yf°

=bXccf'd]W_`YVU```]g'bck 'Uj U]`UV`Y']b'DU`a '6YUW\'7ci bhmž cZZYf]b['U]f!WcbX]h]cbYX'd`Umž'gcW]U`'WcbbYWh]cbgž'UbX a YbhU`'\YU`h\'VYbYZ]hg'h\]g'gi a a Yf"



*\$\$\$`Bcfh\hfYY`6`jX"ž`@U_Y`K cfh\`6YUW\ž'I G5`!`H\]g
gi a a Yfž'd]W_`YVU```Ybh\i g]Ughg`]b`DU`a `6YUW\`7ci bhm'WUb``cc_
Zcfk UfX`hc`d`YbhmcZ'cddcfhi b]h]Yg`hc`Yb[U[Y`]b`h\]g`Zi b`UbX
fUd]X`m`[fck]b[`gdcfh''5g`fYdcfhYX`Vm`DU`a `6YUW\`Dcghž`]bXccf
d]W_`YVU```]g`bck`Uj U]`UV`Y`Uh'j Uf]ci g`fYWfYUh]cb`W\bhYfg`h\fci [\
YUf`m`5i [i gh''`H\Y`ZUW]`]h]Yg`]bWi XY`h\Y`K Ygh`6cmbhcbž`K Ygh[UhYž
UbX`K Ygh'\$\d]hYf`fYWfYUh]cb`W\bhYfgž`YUW\`Yei]ddYX`k]h\`h\fYY
XYX]WUhYX`Wci fhg''; Ua Yg`UfY`d`UmYX`hc`%%`dc]bhgž`c\ZZYf]b[
d`UmYfg`Ub`Yb[U[]b[`k\Um`hc`ghUm`U\h]j\Y`k\]`Y`Yb`cm]b[
Wca dYh]h]cb''

 $\label{eq:hcau_Y'h} Hcau_Y'h\]b[g'YjYb'YUg]Yfž'h\Y'WYbhYfg'Yad`cm'U'bYlh!iddUXX`Y'gmghYa'Zcf'dUfh]W]dUbhg'k\Yb'Wcifhg'UfY'Zi```ž'Ybgif]b['U'by'k']$

ZU]f`Z]fgh!Wca Yž`Z]fgh!gYfj YX`fchUh]cb": cf`h\cgY`YU[Yf`hc`\]h`h\Y Wci fhgž`\YfY g`h\Y`XYhU]`YX`gW\YXi `Y.`K Ygh`6cmbhcb`cdYbg`cb GUhi fXUmg`Zfca '-'U"a "'hc'%'d"a "'i bh]``5i [i gh`&/`K Ygh[UhY`\cghg [Ua Yg`cb`Gi bXUmg`Zfca '%\$`U"a "'hc'%'d"a "'i bh]``5i [i gh`' /'UbX`Zcf K Ygh'\$\dagged d]hYfž`fYgYfj Uh]cbg`UfY`fYei]fYX`Vm`WU``]b[`h\Y`W\bhYf X]fYWh`m"

5 ZZc f X U V ` Y ` 5 V W W gg ` U b X ` : U W] `] h] Y g

 $DUfh]W]dUh]cb ``Wca Yg`Uh`U`bca]bU``ZYY`cZ``f gh```) \check{z}k]h\`h\Y`bchY h\Uh`d`UmYfg`i bXYf`%, `a i gh`\Uj Y`U`[i UfX]Ub`g][b`h\Ya `]b"`H\Y]bXccf`ZUW]`]h]Yg`dfcj]XY`U`Wcc`ž`U]f!WcbX]h]cbYX`Ybj]fcba Ybh`Zcf d`Umž`h\ci [\`h\Ym`a Um``UW_`h\Y`di f]gh`ghUbXUfXg`gca Y`d`UmYfg dfYZYfž`ZYUhi f]b[`dcfhUV`Y`bYhg`UbX`]bhYfgYWh]b[```]bYg`fUh\Yf`h\Ub dYfa UbYbh`gYhi dg"`K]h\ci h`U`Xci Vhž`h\YgY``cWUh]cbg`U]a `hc ZcghYf`U`gUZY`gdUWY`Zcf`d\mg]\W\``Z]hbYgg`UbX`gc\J\U``]bhYfU\h]cbž k\]W\`UfY`\Wfi \J\U``Zcf`a YbhU``k Y``!\Y]b["$

 $\hbox{$cf'h\cgY'k\c'k\g]} \ \hbox{$hc'Yb[U[Y']b'ci\ hXccf'd`Um\check{z}gYj\ YfU`'dUf_g'U]gc ZYUhi\ fY'd]W_`YVU```Wci\ fhg'Uj\ U]`UV`Y'Uh'bc'W\Uf[Y''5g'XYhU]`YX'cb h\Y'DU`a''6YUW\'7ci bhm'DUf_g'k\YVg]hYž'ci hXccf'Wci\ fhg'Zc``ck U'Z]fgh!Wca\ Yž'Z]fgh!gYfj\ YX'dc`]Wm'Xi\ f]b['fY[i\`Uf'dUf_'\ci\ fgž Ybgi\ f]b['k\]XY'UWWYgg]V]`]hm''D`UmYfg'a\ i\ gh'UX\YfY'hc'h\Y'dUXX`Y\ fUW_'gmghYa''UbX'cb`m'k\YUf'gcZh!gc`YX'g\cYg'k\]`Y'cb'h\Y'Wci\ fhg''\ 5'Zf]YbX`m'fYa\]bXYfYbgi\ fYg'Yj\YfmcbY'\Ug'h\Y]f'hi\ fb/']Z'h\YfY'UfY\ d`UmYfg'k\U]h]b[\ ž'mci\ 'a\][\h'Z]bX'mci\ fgY`Z'k\]h\'U''\$!a\]bi\hY'h]a\ Y\ `]a\]h'''Gci\ bXg'ZU]f'Ybci\[\`^$

$H Y A Y b hU^{<} < Y U h ^{6} Y b Y Z hq$

gdYU_g'j c`i a Yg'UVci h']hg']bWi g]j]hm'UbX'UddYU`"

Ghi Xm]b['d]W_`YVU`` g`YZZYWh`cb`a YbhU``\YU`h\`fYj YU`g`U
fYa Uf_UV`Y`hfYbX. 'U`a cgh'- % 'cZ'dUfh]W]dUbhg`]b`h\Y`fYj]Yk YX
ghi X]Yg`k YfY`cj Yf`h\Y`U[Y`cZ') \$ž`k]h\`Vch\`a Yb`UbX`k ca Yb
bYUf`m`Yei U``m`fYdfYgYbhYX"'H\]g`a U_Yg`Zcf`U`j]VfUbh`Wca a i b]hm
k \YfY`U[Y`]gb h`U`VUff]Yfž`UbX`UbmcbY`WUb`[Yh`]bj c`j YX`UbX
VfYU_`U`gk YUh`k \]`Y`\Uj]b[`U`[ccX`h]a Y"

Gcžk\Yh\Yfimci fY`U`gYUgcbYX`d`UmYf`cf`U`bYkV]Y`fYUXm`hc
Ya VfUWY`U`bYk`\cVVmžh\Y`cddcfhi b]h]Yg`Zcf`d]W_`YVU```]b`DU`a
6YUW\`7ci bhm`h\]g`gi a a Yf`UfY`g]a d`m`hcc`[ccX`hc`a]gg"`K]h\
ZUW]`]h]Yg`fYUXm`hc`kY`WcaY`mci `UbX`fYgYUfW\`VUW_]b[`]hg`aYbhU`\
\YU`h\`VYbYZ]hgž`]hg`WYUf.`ghYdd]b[`cbhc`h\Y`Wci fh`a][\h`^{ghVY}h\Y`dYfZYWh`[UaY'd`Ub`Zcf`VYUh]b[`h\Y`gi a aYf`\YUh`k\]`Y
Vccgh]b[`mci f`kY``!VY]b[`

8 YhU]`g	
Cfh	*\$\$\$`Bcfh\hfYY`6`jX"ž'@U_Y`Kcfh\`6YUW\ž
	I G5
EiY``Yb	• k k k "dU`a VYUW\dcgh"Wca
	X]gWcj Yf"dVW"[cj
	• da WbWW]"b`a "b]\"[cj

6Yqi WXYb G]Y i bq Ui Z. a Y]b!k]Yb bYh