

MDIA3004

: Yghj U`g`UbX`9|\]V]hjcbg

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

7ci fgY'Cj Yfj]Yk

Ghuzz 7 cbhuWh8 Yhu]`g

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5`mggU'F ch\k Y``	G	6mYa U]` Uddc]bha Ybh H\i fgXUm	' %%['K YVghYf 6i]'X]b[-',)*,\$+

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D\cbY.'f\$&E'-',)'(,)*

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

 $\label{eq:hamiltonian} $$HY'GWKcc``cZhY'5ftg'UbX'AYX]U'kci`X``]_Y'tc'FYgdYWM\cong \cong m5W_bck`YX[Y'h\Y'HfUX]tjcbU``7i gtcX]Ubg\cong h\Y'6YXY[U'`fPYbg]b[tcb'WJa di g\cong tz'; UX][U'`fP]tmUbX'5fth/ '8Yg][b'7Ua di gYg\cong tubX't\Y'B[i bbUk U` dYcd'Y'fbi gtfU']Ub'8YZYbW': cf\w'5\\WXYa m']b'7UbVYffU\cozh\Y'`UbXg'k\YfY'YUW\cozh\Y'YUW\cozh\Y''UbXg'k\YfY'YUW\cozh\Y'' \cozh\Y''\UbXg'k\YfY'YUW\cozh\Y'' \cozh\Y''\UbXg'k\YfY'YUW\cozh\Y'' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y'''\UbXg'k\YfY'YUW\cozh\Y''' \cozh\Y''' \cozh\Y'''' \cozh\Y''' \cozh\Y'''' \cozh\Y''' \cozh\Y'''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y''' \cozh\Y'' \cozh\Y''' \cozh\Y'' \cozh\Y''' \cozh\Y'''$

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7 fYX]hDc]bhg * *

Gi a a UfmcZh\Y 7ci fgY

Gi VYWh5fYU. ? WW[S

A YX]UʻZcfa Ulgʻ\Uj Yʻi bXYf[cbYʻUʻfUd]XʻdfcWʻggʻcZX]ZI g]cbʻUbXʻX]j Yfg]ZJWUljcbžʻUbXʻh\YʻX]ZZYfYbh_]bXgʻcZ j Ybi YʻUbXʻcddcfhi b]hJYgʻZcfʻj]Yk]b['a YX]Uʻ\Uj Yʻa i `hJd`]YX. cb`]bYža cV]Yʻa YX]Užga UʻʻʻUbXʻ`Uf[YʻgWfYb j Ybi YgʻUbXʻ[UʻʻYfm]bghUʻʻUljcbgʻʻH\]gʻWci fgYʻYl d`cfYgʻh\YʻdfUWlJWUʻʻUgdYWgʻcZWfYUlJb['Uʻ: YghJj Uʻʻcf 9l\]V]hJcbž']bWi X]b['WcbWfdhJcbž'd`Ubb]b[žWca a i b]WUlJcbgʻUbXʻa UbU[Ya YbhcZdYcd`YždfcXi WhUbX ZUWJʻ]hJYgžVi X[Yhždfca chJcbʻUbXʻY[Uʻʻ]ggi Ygʻh\fci [\ hc'h\YʻZ]bUʻʻghU[]b['cZh\Y'Yj Ybh'Nci 'k]``\Uj Yʻh\Y cddcfhi b]lmhcʻ[U]bʻdfUWJWUʻ_bck `YX[YʻcZ: YghJj UʻgʻUbXʻ9l \]V]hJcbgʻh\fci [\ Yl dYf]YbWJb['Z]fgh\UbXʻh\Y gY`YWJcbž'cf[Ub]gUlJcbʻUbX`Yl \]V]hJcbʻcZa YX]UʻYl \]VJhgʻ]bʻUʻdUfhJW `UfʻWcbhYl hž'ZcW g]b['cbʻUʻdUfhJW `Uf dc]bhcZWcbhUWhVykk YYbʻcVʻYWhUbXʻj]Yk YfžVYlk YYbʻA YX]UʻUbX`Ui X]YbWi"

7 ci fgY @YUfb]b[Ci hWca Yg

- %" 5ddfYV]UhY h\Y X]j Yfg]hmcZa YX]U YI \]V]h]cb WcbhYI hg UbX h\Y]f]a dUWicb h\Y dfYgYbhUh]cb cZ a YX]U k cf_g"...
- &"; YbYfUhY`]bbcj Uhj Y`]XYUq`Zcf'h\Y`YI\]V]hcb'cZa YX]U'k cf q"....
- '" =XYbr|Zmrh\Y`|bXi grfmdfcW/ggYg`UbX`dfUWf|\Wg`]bj c`j YX`]b`WfYUr|b['U`ZYgr|j U``cf`YI\]V]h|cb"
- ("9b[U[Y'YZZYWN]Y'mk]h\]b'U'[fcid'hc'dfcXiWY'UbX'dfYqYbhU'dfcdcqU''Zcf'U'ZYqn]iU''cf'YI\]V]h]cb"

HYUWX]b[GhfUhY[]Yg

HYUWX]b['GlfUhY[]Yg.

K YY_`mk cf_g\cdg`k]```dfcj]XY`mci `k]h\`h\Y`Zci bXUhjcbg`cZh\Y`Wci fgYžfY[i `Uf`gi ddcfhZcf`mci f`dfUWf)W\`YI dYf]YbWrg`UbX`dfYdUfUhjcb`Zcf`h\Y`UggYgga YbhiHUg_g"`K YY_`mk cf_g\cdg`k]``XY`]j Yf`UbX`gi ddcfhUggYgga YbhiHUg_XYhU]``UbX`k]``ZcW g`cb`gdYWJZWUgdYWrg`cZd`Ubb]b[`UbX`fi bb]b[`U': Yghj U``cf`9I\]V]hjcb]bWi X]b[`U'dfYgYbhUhjcb`VmUb`UggcWjUhYX`]bXi ghfmdfUWjhjcbYf"`K cf_g\cdg`k]``dfcj]XY`cddcfh b]hmZcf Wf]hjW\`X]gW gg]cb`UbX`[fci d`k cf_'UbX`dfcj]XY`U`Zcfi a `Zcf`mci 'hc`dfYgYbhUbX`g\UfY`mci f`fYgYUfW\ ZbX]b[g"`5ggYgga YbhiHug_g`YbWci fU[Y`Ub`YI d`cfUhjcb`UbX`Wf]hjWU``fYj]Yk `cZWcbhYa dcfUfmZYghj U`g`UbX YI\]V]hjcbg`k \]`Y`XYj Y`cd]b[`YggYbhJU``dfcZYgg]cbU``g_]``g`]bWi X]b['hYUa 'k cf_žj YfVU``UbX`k f]hhYb dfYgYbhUhjcbgž]bbcj Uhjcb`UbX`fYZYWjcb"

5ggYgga Ybh

D`YUgY`VY`Uk UfY`h\Uhigca Y`cZh\Y`]bZcfa Uh]cb`UVci hUggYgga YbhHUg_g`]b`h\]g`XcW`a Ybha UmVY]bWcffYWf`7\YW_mci f`a ccX`Y`g]hY'/`UggYgga YbhVf]YZq`Zcf`h\Y`a cghi d`hc`XUhY`]bZcfa Uh]cb"

5ggYgga Ybh'HUg_g'

5ggYgga Ybh'hJg_	K Y][\h	8i Y'8UHY	Gh XYbh@YUfb]b[Ci hWca Yg 5ggYggYX
±0!7`Ugg'5W¶j]ŊYg'	' \$ı	Bch5dd`]WUV`Y	%₹
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GhUfhXUhY. Bch5dd`]WUV`Y

8YHJ]`g. '5ddfcl '%\$\$\$ 'k cfXg 'hcHJ`": YYXVUW_ ']b! WUgg"

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

Ghi XYbhgʻk]``VYʻ[]j YbʻUʻgdYWJZWUggYgga YbhiHJg_'hcʻWa dʻYhYʻ]bʻh\Y]fʻa X]Uʻ\$\$(:: Yghji Uʻgʻ/9I\]V]hjcbg GYa]bUfʻK YY_gʻ%) "'9UW\']bX]j]Xi U``UggYgga YbhiHJg_\UgʻUʻj Uʻi YʻcZ*ı "'H\YfYʻk]``VYʻU WtffYgdcbX]b['cb`]bY``YUfb]b['UWfj]hmhcʻWta dʻYhYʻdf]cfʻhcʻYUW\'gYa]bUfʻ]bʻdfYdUfUhjcbʻZcfʻYUW\'UggYgga YbhiHJg_"'9UW\'HJg_WUbʻcb`mVYʻWta dʻYhYX`]bʻh\Yʻk YY_']hjgʻ[]j Yb"ʻ\bʻh\Y'Yj Ybhih\UhUb UggYgga YbhiHJg_']gʻa]ggYXXi Yʻhcʻi bUj c]XUVʻYʻg]W_bYgg#a]gUXj Ybhi fYž]ha UmVYʻdcgg]VʻYʻhc UhYbX`Ubch\YfʻgYa]bUfʻhja Yʻ]bʻh\YʻgUa Yʻk YY_"'fC b`mdcgg]VʻYʻk]h\'gi ddcfhXcW a YbhUhjcbʻUbX`Uddfcj U` a i ghVYʻcVHJ]bYXʻj]UʻYa U]`Zfca ʻh\YʻWti fgYʻWtbj Ybcft:H\YʻhchU``j Uʻi YʻcZh\YʻWta dʻYhjcbʻcZU```Zji Y UggYgga YbhiHJg_'`]gʻ' \$i "

5ggYgga Ybh& FYgYUfW DfYgYbhUhjcb

GhUfhiXUhY. Bchi5dd`]WUV`Y

8 YHU]`g. '5 '%' 'a]bi hY j]XYc]b fYgdcbgY hc h\Y fYgYUfW\ 'Vf]YZ": YYXVUW_j j]U Wti fgY @A G"

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

H\]g`XYgWf]dh]cb`g\ci`X`fYUX`U`%\'`a]bi hY`j]XYc#Jb]a Uh]cb#gci bX#cfch\Yf`Zcfa `VmbY[ch]Uh]cb`k]h\`h\Y \\ \text{vc}i fgY`Wcbj Ybcf#i hcf`]b`fYgdcbgY`hc`h\Y`fYgYUfW\`dfYgYbhJh]cb`Vf]YZ'': YYXVUW_j j]U`A ccX`Y \\ Ghi XYbhg`k]```\Uj Y`h\Y`cddcfhi b]hmhc`gi Va]hh\Y`fYgYUfW\`dfYgYbhJh]cb`]b`h\Y]f`gYa]bUf`WUgg`]b`K YY_ \\ \"`Dcgh]b[`UggYgga YbhHJg_g`j]U`h\Y`a ccX`Y`g]hY`k]```bchVY`Uj U]`UV`Y'' \\ D`YUgY`VY`Uk UfY`h\Uhgca Y`cZh\Y`]bZcfa Uh]cb`UVci hUggYgga YbhHJg_g`]b`h\]g`XcW a Ybha UmVY \]b\\cfY\Wf`F\YZ\f`hc`h\Y`a X]U'\\$\\$`: Ygh]j U`g\Z`\91\]V]h|cbg`a ccX`Y`g]hY`Zcf`WcffY\\"UbX`i d`hc`XUhY

]bZcfa Uh]cb"

F Ygci fWYg

DfYgWf]VYX F Ygci fWyg

I gYZ ``fYgci fW'g'k]``VY``]ghYX`cb`h\Y`a X]U' \$\$(`: Ygh]j U`g'/ '9I\]V]h]cbg'a ccX`Y`g]hY''

FYWca a YbXYX FYgci fW/g

5 'fY`]UV`Y`UbX`dfcZYgg]cbU``\UfX!Xf]j Y`]g`YggYbh]U``hc`Ybgi fY`h\UhU```dfcXi Whcb`k cf_`]g`VUW_YX`i d`UbX qUZY`mqhcfYX`Zcf`h\]g`Wci fqY`UbX`Zcf`Z hi fY`i qY`]b`mci f`A YX]U`DfcXi Whcb`DcfZc`]c"

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

5 'We'a V]bUrJicb'cZh\Y'Zc'`ck]b['UddfcUW\Yg'k]'`VY'i gYX'rc'[Uh\Yf'ZYYXVUW_'UVci hih\Y'We'i fgY"'I BGK A m9I dYf]YbWY'We'i fgY'UbX'HYUW\]b['Yj U'i UrJicb'UbX']a dfcj Ya YbhdfcWYgg"'5bYWkchU`'9j U'i UrJicbžk \YfY ghi XYbhg'Zfca 'rJa Y'rc'lJa Y'Xi f]b['h\Y'gYa YghYf'UfY'Yb['U[YX']b']bZcfa U'X]gW gg]cbg'UVci hih\Y'We'i fgY" C VgYfj UrJicb'k \YfY'h\Y''YWi fYf'fWe'bj YbYf'cf'hi reft-fY['i 'Uf'mcVgYfj Yg'h\Y'YZYWfj YbYgg'cZ WUggYg'UbX''YWi fY'UbX'a cX]ZJYg'h\Y'We'i fgY'We'bhYbhUbX'XY']j Yfm]b fYgdcbgY'rc'h\cgY'cVgYfj UrJicbg" DUghYj U'i UrJicb'ZbX]b['g'\UyYYb'UWYX'i dcb']b'h\Y'Zc'`ck]b['k Umg"'=kk Ug']XYbhJZYX'h\fci [\'ZYYXVUW_h\Unghi XYbhg'VYbYZ]h'X'k\Yb'n\Y'We'i fgY'UggYgga YbhrUg_g'k YfY'U'][bYX'k]h\bYYXg'cZh\Y'W]YbhdfcYWhUbX'W]YbhdfcYWh''=kk Ug']XYbhJZYX'\Uy''h\Yh\Y']b'dughZYYXVUW_h\Uh\ZYYXVUW_U''\U'''UggYgga YbhrUg_g'fy'\Uh''X]fYWhmhc'h\Y W]YbhdfcYWh'''=kk Ug']XYbhJZYX']b'dughZYYXVUW_h\Uhh\YfY'k Ug'UbYYX'Zcf'gh XYbhg'hc'\Uj'Ya cfY']b'WUgg rJa Y'rc'k cf_'cb'['fci d'dfcYWg'UbX']bX]j JXi U''dfcYWg"'=b'fYgdcbgY'hc'h\UhZYYXVUW_h\DhYfY']g'a cfY'fja Y U''cWUhYX'Zcf']bXYdYbXYbh'/'['fci d'fYgYUfW\''hUg_g'k]h\]b'h\Y'k YY_mWe'i fgY'ghfi Wh' fY'''H\YfY']g'bck 'a cfY WUgg'ha Y'rc'k cf_'k |h\'ch\Yf'gh XYbhgzYb['U[]b[']b'WYUhj Y'dfcV'Ya 'gc'j]b['''=kk Ug']XYbhJZYX']b'dUgh ZYXVUW_h\Uh'Uh'Ub'Jj Y'UbX']bhYfUWfj Y'WUgfcca 'Ybj]fcba Ybhk Ug'a cghYb['U[']b[''UbX'YbhZ]WY''rc 'YUfb]b['''-b'fYgdcbgY'hc'h\Uh'X''-YUWff fY''''-b'YYYb'f''-b'fYXYg]['bYX'hc'YbWe'i fU['Y''''-YUYff dUff)WfUhjcb'UbX'gh XYbhyb['U['Ya Ybhk]h\'we'i fgY'WebhYbhk]h\'ub'Ya d\Ug]g'cb'gy'ZXjfYWhYX''YUffb]b['''-b'fYXYg]['bYX'hc'YbWfi''-b'fyUhff dUff)WfUhjcb'UbX'gh XYbhyb['U['Ya Ybhk]h\'we'i fgY'WebhYbhk]h\'ub'Ya d\Ug]g'cb'gy'ZXjfYWhYX''YUffb]b['

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±bZcfa Uhjcb

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

- fYei YghgʻZcfʻYl hYbg]cb/`UhYʻgi Va]gg]cbgʻ[i]XY`]bYg/
- fYj]Yk 'cZa Uf_g/
- I BGK < YU`h\ UbX GUZYmdc`]W]Yg/
- YI Ua]bUh]cb dfcWXi fYg/