



## IEST7600

ϕX][ Ybci g' bck `YX[ Y`DUftbYfg\]dg`]b`7 cbgYfj Uh]cb`/  
7 Uf]b[ `Zcf`7 ci bfm

HYfa `Hk c` `##`&\$&%



7ci fgY'8YHJ]`g

7fYX]hDc]bqg '\*`

Gi a a UfmicZ`h`Y'7ci fgY

⊕X][ Ybci g`\_bck`YX[ Y`c`XYfg`UFY`k`cf\_]b[ `k`]h`ck`hc`Ufh]W`UH`h`Y]f`\_bck`YX[ Y`dfUW]W]g`UbX`VY`]Yz`hc`  
bcb!⊕X][ Ybci g`UbX`bcb!`cWU`Ui`X]YbW]g"⊕`h`]g`Vci`fgYz`mci`k`]`Z`W`g`cb`Yh`]WU`UbX`Yei`]hUV`Y`k`Umg`cZ`  
]bh[ fU]b[ `⊕X][ Ybci g`UbX`cWU`\_bck`YX[ Y`gmg]Ya`g`k`]h`K`Ygh]fb`gW]Ybh]Z]W`\_bck`YX[ Y`gmg]Ya`g`hc`  
]bZ`fa`gi`ghU]bUV`]hmiUbX`VcbgYfj`U]cb`dc`]WmiUbX`dfUW]W]"Mci`k`]`YUfb`UVci`hUddfcdf]UH`UbX`YZZ]W]j`Y`  
k`Umg`hc`g`UFY`UbX`Vca`V]bY`h`YgY`\_bck`YX[ Y`gmg]Ya`g`Z`f`Vc`UVcfU]h]Y`Ybj`]fcb`a`YbhU`"YUXYfg`d"⊕`h`Y`  
a`]XghcZ[ `cVU`W]gYgž]bWi`X]b[ `W]a`UH`X]gfi`dh]cbž`Uf[ Y`gWU`Y`Yi`h]bW]h]cbgž`UbX`Yi`UW]fVUH`X`Vi`g`Z]fYgž`  
mci`k`]`fYh]b`\_k`Umg`gcW]YhmiW]b`VcbW]dh`U`]gY`Ybj`]fcb`a`YbhU`dfcV`Ya`g`UbX`VcbgYfj`U]cb`dfUW]W]g"⊕`  
UXX]h]cbž`mci`k`]`]bj`Ygh[ UH`ck`hc`Vi`]X`fY[ ]cbUž`bU]cbUž`UbX[ `cVU`gW]YbW]dc`]Wmi`h`Uh]g]bWi`g]j`Y`cZ`  
g]h`UH`X`⊕X][ Ybci g`UbX`cWU`\_bck`YX[ Y`gmg]Ya`g`k`]h`ci`h`Vca`dfca`]g]b[ `h`Y`]bh[ f]hmicf`Y[ ]h]a`UWmicZ`  
gW]Ybh]Z]W`⊕X][ Ybci gž`cf`cWU`\_bck`YX[ Y`gmg]Ya`g`

7ci fgY`@YUfb]b[ `Ci hWca Yg

%`8YgW]VY`h`Y`]bh]fVcb`bbYW]XbYgg`cZ`W`h`fY`UbX`YVc`c[ m]b`⊕X][ Ybci g`UbX`cWU`\_bck`YX[ Y`  
gmg]Ya`g`UbX`h`Y`dcgg]V`]h]Yg`Z`f`Yh`]WU`]bh[ fU]cb`k`]h`K`Ygh]fb`gW]Ybh]Z]W`\_bck`YX[ Y`  
&"5dd`mia`i`h]d`Y`Yj`]XYbW]VUgYg`hc`h`Y`h`Y`c`fm`UbX`dfUW]W]cZ`UbX`fYg`hc`fU]cb`UbX`W]fY`

## 5ggYgga Ybh

<Ufj UfX'fYZYfYbW]b[ 'gmgHYa 'g\ci 'X'VY'i gYX'Zcf'YggUmiUbX'Z]bU'fYZYW]cb"

5`UggYgga Ybhg'k ]`VY'ci h]bYX' ]b'WUgg' ]b'k YY\_`%"

## 5ggYgga YbhHUg\_g

5ggYgga YbhHUg_	K Y][ \h	8i Y'8UH	Gh XYbh@YUfb]b[ Ci hWca Yg'5ggYggYX
DYfgcbU'@YUfb]b[ '>ci fbU'	&\$i	Z]fgh'ci fbU'Xi Y'k YY_`% \$( #*\$ #&\$&%&da 'hYb k YY_mžk ]h 'hY'Z]bU'`ci fbU' Xi Y'k YY_`* \$- #+\$&\$&%&da	%ž' ž(
9ggUmi	' \$i	% #+\$&\$&%%%\$ \$DA	%ž'
F YZYW]cb'	) \$i	: ]bU'k f]hYb'fYZYW]cb'Xi Y : f]XUmcZk YY_`%\$ fBi [ i gh *Ł	%ž'&ž' ž(

## 5ggYgga Ybh8YHJ]g

5ggYgga Ybh% 'DYfgcbU'@YUfb]b[ '>ci fbU'

GHUfhXUH. 'Bch5dd ]WUVY

@Yb[ h. 'a ]b]a i a '&\$ \$'k cfXg'UbX'a Ul ]a i a ') \$ \$'k cfXg'Zcf'YUW'cZk YY\_g`%ž\*"

8YHJ]g.

H\Y'ci fbU'k ]`VY'Ydhihfc [ \ci hihY'hYfa žk ]h'k YY\_mYbhf]Yg fgi Va ]hYX'k YY\_m'Z'YXVUW\_j ]U'j YfVU'  
cf'k f]hYb'Wca a Ybhg'F Yei ]fYg'W]hW'UbX'dYfgcbU'Yb[ U[ Ya Ybhk ]h 'Wci fgY 'WcbhYbhUbX'Yi dYf]Ybh]U'  
'YUfb]b[ ž'UbX'a Um]bWi XY'g\cfhfYZYW]cbg'cb'U'bi a VY'cZdfY!gYhei Ygh]cbg"@Yb[ h. '&\$ \$'k cfXg'dYf'  
k YY\_`Zcf'k YY\_g`%ž\*"

: YXVUW\_j ]U'U'fi Vf]Wžbi a Yf]W'a Uf\_ž'UbX'Wca a Ybhg"

## 5XX]h]cbU'XYHJ]g.

H\Y'ci fbU'hUg\_`Zcf'k YY\_`%k ]`VY'dcghYX'cb'a ccX'Y'VYZcfY'hYfa 'ghUfhg'UbX']g'hc'VY'Wca d'YH'X'Zcf'  
X]gW'gg]cb']b'WUgg'cb': f]XUmcZk YY\_`%"

>ci fbU'g'Zcf'gi VgYei Ybhk YY\_g'k ]`VY'VUgYX'cb'mci f'ck b'YUfb]b[ 'fYZYW]cbg'fW]hYf]U'UbX'[ i ]XUbW'  
dfcj ]XYX' ]b'WUgg'k YY\_`%ži b'Ygg'chYf'gdYW]W]hUg\_g'UFY'gYH'

Gi Va ]gg]cb' bchYg. 'Gi Va ]h'fc [ \a ccX'Y'' ]b\_`cb': f]XUmZcf'YUW'cZk YY\_g`%ž\*"

Hi fb]h]b'gYH]b[ . 'H\]g ]g' bchU'Hi fb]h]b'Ugg][ ba Ybh

5ggYgga Ybh&. '9ggUm

@Yb[ h. '%&\$!%(\$ \$'k cfXg'fbch]bWl X]b[ 'fYZfYbW'']gH

8YHJ]g.

H\Y'YggUmfUVci h%&\$ \$'k cfXg'k ]''ci h]bY'Yh]Wl''UbX'Yei ]hUV'Y'k Umg'cZ]bH'fUH]b[ 'fX][ Ybci g'UbX''cWl' \_bck 'YX[ Y'gmgh'a g'k ]h'K Ygh'fb'gVYb]h]ZW\_bck 'YX[ Y'hc' ]bZcfa 'gi ghU]bUV] ]miUbX'Wc'bgYfj U]cb'dc' ]Wn UbX'dfUW]W''@YUfb]b[ 'k ]''VY'VUgYX'cb'gYa ]bUfg'UbX'dfYgYbH]cbgž'fYUX]b[ gž'UbX'Wc'bj YfgU]cbg''Gca Y \i fX'Y'Ugg][ ba Yb]g'gi W'Ug'cb' ]bY'ei ]nnYgžk ]''VY' ]bWl XYX"

: YYXVUW\_ k ]''VY' [ ] Yb' ]b'hY'Zcfa 'cZU'fi Vf]W]bWl X]b[ 'hY'\i fX'Y'hUg\_gž'bi a Yf]Wl'a Uf\_ž'UbX Wc'a a Yb]g"

5XX]h]cbU'XYHJ]g.

<i fX'Y'Ugg][ ba Yb]g'k ]''VY'gYhZcf'k YY\_g'&! ( 'UbX'dfcj ]YXX'cb'a ccX'Y"

9ggUmW]h'f]U'UbX' [ i ]XUbW'k ]''VY'dfcj ]YXX' ]b'WUgg' ]b'k YY\_ '%fgi Va ]gg]cb'XUH'Zcf'YggUm]g'>i 'm% 'L"

Gi Va ]gg]cb' bch'g. 'Gi Va ]h'h'fci [ '\ 'a ccX'Y'' ]b\_

Hi fb]h]b'gYH]b[ . 'H\]g' ]g'bchU'Hi fb]h]b'Ugg][ ba Ybh

5ggYgga Ybh' . 'F YZYW]cb

GHUfhXUH. 'Bch5dd' ]WUV'Y

@Yb[ h. '&\$ \$\$'k cfXg'fbch]bWl X]b[ 'fYZfYbW'']gH

8YHJ]g.

H\Y'Z]bU'UggYgga Ybh'fUVci h&\$ \$\$'k cfXg'k ]''VY'U'fYZYW]cb'cb'k \Uh\Ug'VYYb''YUfb]h'fYfUa YX'UbX i bXYfg'ccX'Xi f]b[ 'hY'Wc'i fgY''H\Y'UggYgga Ybhk ]'' ]bWl XY'U'k f]hYb'hUg\_'fUggYggYX'Vmi b]j Yfg]m UW]XYa ]W]L'UbX'hY'ch'Yf'Wc'a dcbYb]g'cZ'hY'UggYgga Ybhk ]''VY'VUgYX'cb'XYa cbgfU]cb'cZ i bXYfg'UbX]b[ ' ]b'hY'Z]Y'X''H\Y''cWl''\_bck 'YX[ Y'Ui h'cf]h]Yg'k \c'\cgh'hY'Z]Y'X'f]d'k ]''Wc'!XYg][ b'h\]g UgdYW]cZ'hY'YUfb]b[ 'hUg\_'UbX'VY'Wc'!UggYggc'fg'cZ'Wc'a dY'h'bW'#YUfb]b[ 'ci h'Wc'a Yg"

: YYXVUW\_ j ]U'U'fi Vf]W]bWl X]b[ 'hY'\i fX'Y'hUg\_gž'bi a Yf]Wl'a Uf\_ž'UbX'Wc'a a Yb]g"

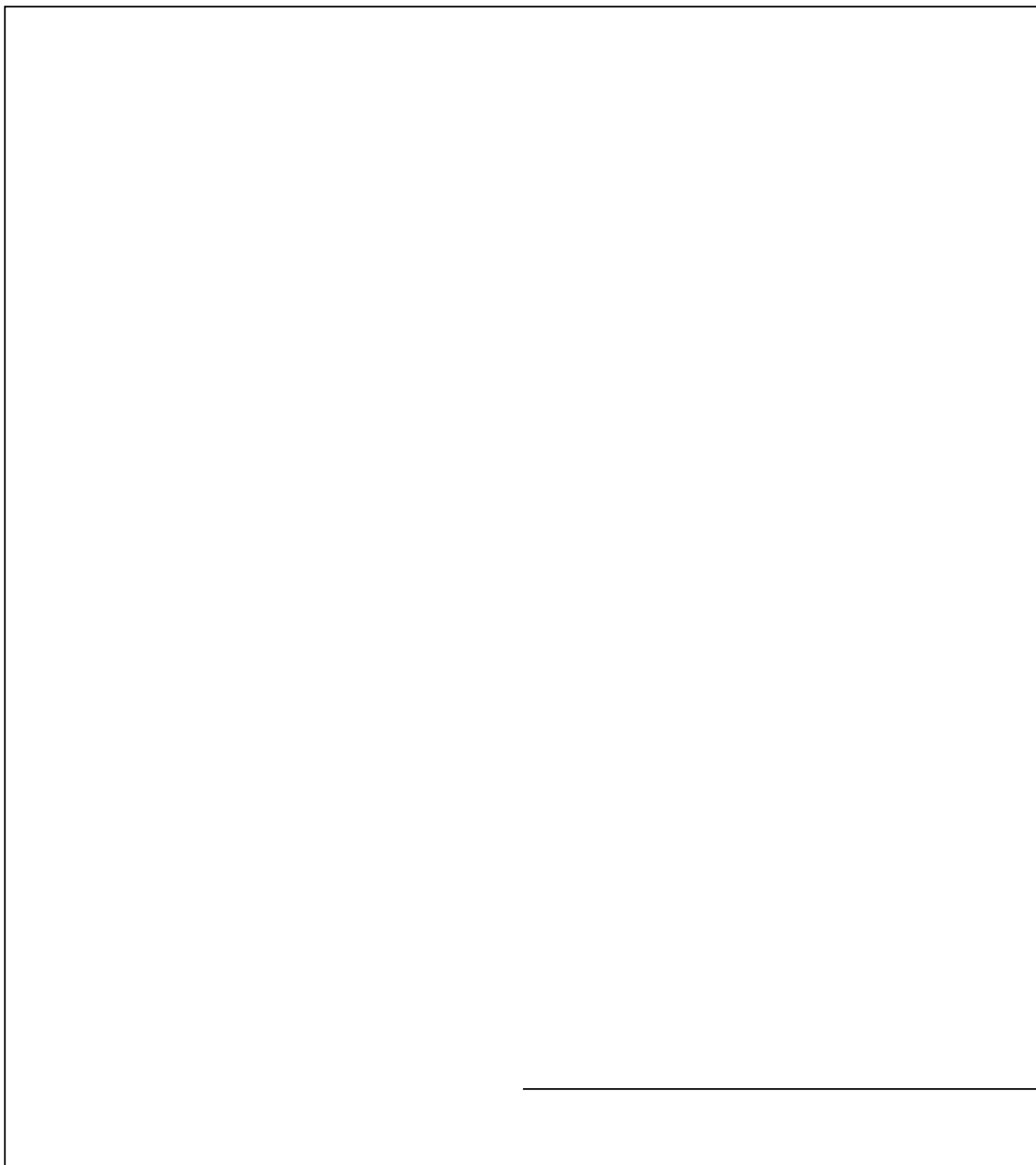
5XX]h]cbU'XYHJ]g.

H\Y'hUg\_'XYg][ bYX'UbX'UggYggYX'VmHfUX]h]cbU''7i gh'cX]Ubg'k ]''VY'i bXYf]U\_Yb'Xi f]b[ 'hY'a i 'h]!XUmZ]Y'X h]d'UbX'k ]''VY'k cf'h'&) i 'f]U'ZcZ'hY') \$i 'L

H\Y'Z]bU'k f]hYb'fYZYW]cb'fa Uf\_YX'VmiWc'i fgY'Wc'bj Ybcfg'k ]''VY'ci h]bYX'Xi f]b[ 'WUgg' ]b'k YY\_ '%UbX' ]g Xi Y'YbX'cZ'h'fa 'f] f]XUm5i [ i gh'\*h'žk YY\_ '%\$L"

Gi Va ]gg]cb' bch'g. 'Gi Va ]h]Z]bU'k f]hYb'fYZYW]cb'h'fci [ '\ '' ]b\_'cb'a ccX'Y"

Hi fb]h]b`gYh]b[ .`H\]g`]g`bchU`Hi fb]h]b`Ugg][ ba Ybh







# F Ygci fWg

## DfYgWf]VYX`F Ygci fWg`

5`W fUHfX`gYhcZa UbXUhcfmfYgci fWg`k ]`VY`Uj U]UV`Y`h`fci [ \`@Y[ Ubhc`UbX`cb`h`Y`Wci fgY`a ccX`Y`g]h`Zcf`h`Y`ghUfhcZHfa "

H\YfY`]g`U`j UghUffUmcZ`]h`fUhi`fY`UbX`k`YV]bUfgz`dcXWUghg`YhW`h`Uhi]bZcfa`h`]g`Wci`fgY`" `#i]g`ghfcb[ `m`fYWca`a`YbXYX`h`Uhmci`ghUfh`cc\_]b[ `UhfY`Yj`UbhfYgci`fWg`VY`ZcfY`h`Y`Wci`fgY`ghUfhg`"Gca`Y`fYgci`fWg`fUj`U]UV`Y`h`fci [ \`@Y[ Ubhc`UbX`Ug`YVcc\_g`]b`I`BGK`"]VfUfm`h`c`ghUfhk`]h`]bWi`XY.

"8Uf`\_`9a`i`"Vm6fi`W`DUgWcY`

"@cj]b[ `7ci`blfm`"7\Udhf`%`fd`%`d`%`cb` ;`i`U[ U/` `6]Ua`Ub[ U`fdYdUfUhc]b`Zcf`ZY`X`hf]d`&`\$`\$`

"Gcb[ `]bYg`!`H\Y`Dck`Yf`UbX`h`Y`Dfca`]gY`"VmA`Uf[ c`BYU`UbX`@mbbY`?`Y`m`&`\$`\$`

"GUWYX`9Wc`c[ m`Vm: ]f`Yh6Yf`\_Yg`&`\$`&`

## F YWca a YbXYX`F Ygci fWg

5`"]ghcZk`]XYf`fYWca`a`YbXYX`fYgci`fWg`fYVcc\_g`]b`I`BGK`"]VfUfmUbX`"]b`\_YX`h`c`@Y[ Ubhc`h`]bWi`XYg.

"Gcb[ gd]fU`g`!`g\Uf]b[ `k`ca`Yb]k`]gXca`c`Z7ci`blfm`h`fci [ \`gcb[ `]bYg`"Vm`h`Y` ;`Umfk`i` ;`fci`d`c`ZK`ca`Ybž`&`\$`%`ž`5`Yb`/`I`bk`]b`

"H\Y`8fYUa`]b[ `UbX`c`h`Yf`YggUmg`"VmK`"9"<"`GhUbbYf`

"6fU]X]b[ `Gk`YYh`fUgg`!`#X][`Ybci`g`K`]gXca`ž`GWYbh]Z]W?`bck`YX[`Y`UbX`h`Y`HYUW]b[`g`c`ZD`Ubhg`"VmF`cV]b`K`U`"?`]a`a`YfYf`&`\$`%`!`fYUX`d`&`(%`&)`" "

Hk`c`df]bhVcc\_g`Uj`U]UV`Y`]b`I`BGK`"]VfUfm`"GUbX`HU`\_"VmHmgcb`M`b`UdcftU`

## 7ci fgY`9j`U`i`Uh]cb`UbX`8Yj`Y`cda`Ybh

H\]g`]g`h`Y`]bUi`[`i`fU`m`Y`Uf`Zcf`h`]g`Wci`fgY`"5g`k`Y`"Ug`h`Y`a`n9I`dYf]YbW`ZYXVUW`ž`U`gi`fj`Ymk`]`VY`dfcj`]XYX`h`c`gh`XYbh]h`c`Wca`d`Yh`Zcf`ZYXVUW`cb`h`Y`ZY`X`hf]dg"

Gi Va ]gg]cb 'cZ5ggYgga YbhiHUg\_g

Hi fb]h]b 'Gi Va ]gg]cb

Ẓmci 'YbWci bHYf'U'dfcV'Ya 'k \Yb'UHYa dh]b[ 'hc'gi Va ]hmc i f'Ugg][ ba YbhiH'fci [ \ 'Hi fb]h]bž'd'YUgY  
HY'Yd\cbY'9I HYfbU'Gi ddcfhcb'- ' , ) " ' ' %cf'Ya U] 'H'Ya 'cb'YI HYfbU'HY'gji ddcfh4 i bgk "YXi "Ui "'Gi ddcfh  
\ci fg'UfY' , .\$\$Ua '—%\$. \$\$da 'cb'k YY\_XUmg'UbX'-. .\$\$Ua '—) . \$\$da 'cb'k YY\_YbXg'fI \*) 'XUmg'U'mYUfI" Ẓmci  
UfY'i bUV'Y'hc'gi Va ]hmc i f'Ugg][ ba YbhiXi Y'hc'U'Zji 'hk ]H'Hi fb]h]b'mci 'a UmiUdd'm'Zc'f'Ub'YI HYbg]cbž'Vi hmc i  
a i ghfYH]b'mci f'h]W'Yhbi a VYf'Z'ca '9I HYfbU'Gi ddcfhfU'cb[ 'k ]H'Ubmich'Yf'fY'Yj UbhXcW a Yb'gk'hc  
]bWi XY'Ug'Yj ]XYbW'hc'gi ddcfhmc i f'YI HYbg]cb'Udd'j]W]h]cb" Ẓmci 'Ya U] '9I HYfbU'Gi ddcfhmc i 'k ]`

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

D`U[ ]Uf]ga `]g`i`g]b[ `h`Y`k`c`f`X`g`c`f`]X`Y`U`g`c`Z`c`h`Y`f`g`i`U`b`X`d`f`Y`g`Y`b`h]b[ `h`Y`a` `U`g`m`c`i`f`c`k`b`" `#`W`U`b`h`U`\_`Y`a` `U`b`m`  
Z`c`f`a`g`Z`Z`c`a` `X`Y`]V`Y`f`U`H`Y` `W`X`Y`U`H]b[ `h`c`U`W`W`Y`X`Y`b`h`U`m`i`W`c`d`m]b[ `Z`c`a` `U`g`c`i`f`W`k`]h`c`i`h`U`W`b`c`k` `Y`X[ `Y`a` `Y`b`h`

- i bXYfghUjX'mci f'f][ \hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[ ]Uf]ga ž'Wc'dmf][ \hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'UjX'5W'W'dhUV'Y'I gY'cZ  
I BGK '⇒H'F'Ygci f'W'g'Dc`]W'h
- VY'Uk UfY'cZ'Y'ghUjX'UfX'g'cZVY\Uj ]ci f'YI dY'W'X'cZYj Yfmc'bY'j]b'h'Y'I BGK 'W'a a i b]m
- `cW'U'Y'gY'fj ]W'g'UbX'j]bZ'c'fa U]cb'UVci hi BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZ'Y'gY'UfY'Ug'k ]`VY'ZJa ]]Uf'hc'mci ž'c'h'Y'fg'k ]`VY'bYk "; U]b]b[ 'U'gc`X'i bXYfghUjX]b[ 'cZU`'h'Y  
fY'U'Y'X'UgdY'W'g'cZ9@G9'k ]`'Y'd'mci 'a U\_Y'h'Y'a cgh'cZ'mci f'gh X]Yg'Uhl BGK ""

[\h'c.#\]i V'Y'W'f i \]X'Y'g"\]V'f'U'f'm'i b'g'k "Y'X'i "U'i #' \]g'Y'#\]V'c'i h' \]g'Y](#)

