



## EDST5454

8Yj Y`cd]b[ `@]hYfUW]Yg.: fca `? ]bXYf[ UfhYb`hc`l b]j Yfg]lm

GYa YghYf`Hk c`#`&\$%

GWXcc``cZ9XI WJhcb`#`l BGK ``5fhg`UbX`GcWU``GvYbWg

# 7ci fgY'Cj Yfj JYk

'GHZZ7cbhUWhi8YHJ'g'

'7cbj Ybcfg'

B Ua Y	9a Uj'	5j Uj'UVj]jm	@cWWhcb	D\cbY
Gi Y'C`Yf\YUX	g"c`Yf\YUX4 i bgk "YXi "Ui	Hi YgXUmg`%Ja `hc`%da	>c\b'; ccXgY`(`%)	-', ), &('

'@YWhi fYfg'

B Ua Y	9a Uj'	5j Uj'UVj]jm	@cWWhcb	D\cbY
Gi Y'C`Yf\YUX	g"c`Yf\YUX4 i bgk "YXi "Ui	Hi YgXUmg`%Ja `hc`%da	>c\b'; ccXgY`(`%)	-', ), &('

## GWx cc`7cbhUWhi`bZcfa Uhjcb

GWx cc`cZ9Xi WWhcb

5fng`UbX`GcWjU`GWYbWg

@Yj Y`%Z`>c\b'; ccXgY`"6i ]X]b[ `f! &\$t

H. `Z`\*`%f&t`-' , )`%`++

9. YXi WWhcb4 i bgk "YXi "Ui

K . YXi WWhcb"Ufng"i bgk "YXi "Ui

## 5HhYbXUbW`F Yei ]fYa Ybhg

5XX]h]cbU`GWx cc`cZ9Xi WWhcb`UHhYbXUbW`fYei ]fYa Ybhg

h]g`YI dYWYX`h.UhUbmghi XYbhYbfc`YX`]b`Ub`98GH`Wci fgY`k ]h`hY`GWx cc`cZ9Xi WWhcb`k ]`a`U\_Y`U`W`a`a`]ra`Ybhi`h`hY`f`Y`Ufb]b[ `UbX`UHhYbX`U`WUggYg`]b`Z`"k`YfY`W`b`h`b`h]g`XY`]j`YfYX`]b`U`ZUW`!`h`!`ZUW`a`cXY`YI`W`dh]b`W`f`U]b`W`f`W`a`ghUbW`g`k`YfY`UVgYbW`]g`Xi`Y`h`c`]`b`Ygg`za`]g`UXj`Ybh`fY`cf`i`b`Z`f`Y`g`Y`Y`b`W`f`W`a`ghUbW`g`VYmcB`h`Y`gh`XYbhg`W`b`h`c`"5`a`]b]a`i`a`UHhYbXUbW`f`Yei`]fYa`Ybhcz,`\$i`]g`f`Yei`]fYX`Z`f`Y`U`W`X`W`ci`fgY`"b`W`f`U]b`W`f`W`a`ghUbW`g`z`U`gh`XYbhia`Uma`]gg`i`d`h`c`&\$i`c`Z`U`W`ci`fgY`k`]h`ci`h`Z`fa`U`Udd`]WWhcb`UbX`i`d`h`c`"i`c`Z`U`W`ci`fgY`k`]h`Z`fa`U`X`c`W`a`Y`b`h`U`h`c`b`f`g`Y`b`h`j`]U`Ya`U`]`h`c`W`ci`fgY`W`c`b`Y`b`c`f`l`d`f`c`j`]X]b[ `U`"h`Y`f`Yei`]fYa`Ybhg`XYH]YX`VY`c`k`UfY`a`YH`"G`h`XYbhg`b`cha`YYh]b[ `h`Y`UHhYbXUbW`f`Yei`]fYa`Ybhg`ci`h]b`YX`U`V`c`j`Y`k`]`V`Y`U`k`U`f`Y`X`U`b`i`b`g`U`h`g`Z`U`W`c`f`m`:`U`]`f`l`:`E`Z`f`h`U`h`W`ci`fgY`f`Y`[`U`f`X`Y`gg`c`Z`h`Y`f`d`Y`f`Z`fa`UbW`]b`h`Y`U`gg`Y`g`ga`Y`bh`U`g`\_`c`f`c`h`Y`f`f`Yei`]fYa`Ybhg`Z`f`h`Y`W`ci`fgY"

: cf`Z`f`h`Y`f`]b`Z`fa`Uhjcb`cb`9Xi`WWhcb`W`ci`fgY`UHhYbXUbW`f`Yei`]fYa`Ybhg`z`d`Y`U`g`Y`f`Y`Z`f`h`c`h`Y`f`Y`g`d`Y`W`h`j`Y`98GH`A`ccX`Y`a`cXi`Y`f`g`t`"

## 5WUXYa ]W`bZcfa Uhjcb`

: cf`Y`gg`Y`bh]U`gh`XYbh]b`Z`fa`Uhjcb`f`Y`Uh]b[ `h`c`f`Yei`Y`g`h`Z`c`f`YI`h`b`g]cb/fYj`JYk`c`Za`Uf`\_`g`/c`W`W`d`U`h]cb`U`"Y`U`h`UbX`g`U`Z`f`m`/YI`Ua`]b`U`h]cb`d`f`c`W`X`i`f`Y`g`/g`d`Y`W`U`W`c`b`g]X`Y`f`U`h]cb`]b`h`Y`Y`j`Y`bh`c`Z`]`b`Y`gg`c`f`a`]g`U`X`j`Y`bh`f`Y`/`gh`XYbh`Yei`]m`UbX`X`]g`U`V`]`]m`/UbX`]f`Ya`Y`b`\$`]g`U`X`j`Y`bh`f`Y`/`

7 ci fgY`8YHJ]`g

7 fYX]hDc]bHg`\*`

K cf\_`cUX

%) \$\`ci fg]bWf X]b[ `WUgg`WcbHUVh\ci fgžfYUX]b[ gž`WUgg`dfYdUfUf]cbžUggYgga YbžZc``ck`i d`UWfj] ]hYgž  
YhW

Gi a a UfmcZ`h\Y`7 ci fgY

H\]g`Wci fgY`k ]``Ugg]ghmci` ]b`i bXYfgfUbX]b[ žXYj Y`cd]b[ `UbX`Yj U`i Uh]b[ `mci f``]fYfUWfndfUl ]g`VmYl d`cf]b[





# 5ggYgga Ybh

## 5ggYgga YbhHUg\_g`

5ggYgga YbhHUg_	K Y][ \h	Gh XYbh@YUfb]b[ Ci hWta Yg 5ggYggYX	5 #HG@DfcZYgg]cbU` ; fUXi UHY HYUWX ]b[ `GHUbXUfXg`5ggYggYX	8i Y 8UHY
DfYgYbHU]cb`	( \$i	%z&	%"&z%" " z "%&	' %/\$, #& \$% \$) . \$\$ DA
DfcdcgU`	* \$i	&Z ž(	%"%"&z%"&"&z%" " ž%"&z%"&" " z "%&	&&#/\$#& \$% \$) . \$\$ DA

D`YUgY`fYZf`hc`3gefD`[S` BdaXWee[a` S^E fS` VSdVe XadFWSUZWte`cb`hY`dfYj`]ci`g`dU[Y`

## 5ggYgga Ybh8YHU]`g

5ggYgga Ybh%`DfYgYbHU]cb`

GHUfhXUHY.`

8YHU]`g. `HUg\_`%`!`DfYgYbHU]cb`!`%\$`a` ]bi` hY` `a` i` `hja` YX]U`V]V`]c[` fUd\`mdfYgYbHU]cb`cb`\_Ym]XYUg`UbX`  
XYVUH`g`d`i`g`)` \$\$!`k`cfX`gi` a` a` UfmGh` XYb`hg`k` ]`fYVW`j` Y`k` f]hYb`ZYXVUW`\_k` ]h`b`%\$`Vi`g]bYgg`XUmg`cZ`  
gi`Va` ]gg]cb`

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

5ggYgga Ybh5. `6]V`]c[` fUd\`mdfYgYbHU]cb. `\_Ym]XYUg`UbX`XYVUH`g`

GY`YWHU`YUfbYf`[` fci` d`hc`fYgYUfW`f]`Y`"mci` b[` `WX`]XFYbžUXc`YgW`bhgžUXi` `hgL`"K` \UhiUFY`hY`W`ffYbh`\_Ym`  
]XYUg`UbX`XYVUH`g`k` ]h`fY`[`UfX`hc`"]`hYfUWH`XYj`Y`cda`YbhZc`f`h`]g`YUfbYf`[` fci` d3`7` \ccg`Y`)`fYVW`bhUbX`  
fY`Yj`Ubhgci`fW`g`h`Uhrci` \Uj`Y`W`bgi`hY`]b`mci`f`fYgYUfW`"7`f]h]W`"miUbU`mgY`YUWX`gci`fW`žgi`a`a`Uf]g]b[`  
hY`\_Ymidf]bW]d`Yg`mci` \Uj`Y`YUfbYX`Zca`YUWX`cbY`"8`]gW`gg`hY`k`Umg`]b`k` \]W`mci`f`fYgYUfW`k` ]`"bZc`fa`  
mci`f`dfUW]W`]b`hY`WUggfcca`"

Hi`fb]h]b`gYh]b[`. `H\]g`Ugg][`ba`Ybh]g`gi`Va` ]hYX`h`fci`[`\`Hi`fb]h]b`UbX`gh`XYb`hg`W]b`gY`Y`Hi`fb]h]b`g]a` ]Uf]m`  
fYdcfg`"

5ggYgga Ybh&`DfcdcgU`

GHUfhXUHY.`

8YHU]`g. `HUg\_`&`!`DfcdcgU`!`" `\$\$`\$`k`cfXgK`f]hY`U`dfcdcgU`Zc`f`U`"]hYfUW`ngi`ddcfhdfc[`fUa`Zc`f`U`hUf[`Yh`  
YUfbYf`[` fci` dGh`XYb`hg`k` ]`fYVW`j` Y`k` f]hYb`ZYXVUW`\_k` ]h`b`%\$`Vi`g]bYgg`XUmg`cZgi`Va` ]gg]cb`"

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

5ggYgga Ybh6. 'K f]h'U'dfcdcgU'Zcf'U'fuf[ YhX''h'fUWngi ddcfhdfc[ fUa 'Zcf'Ub']XYbh]ZYX''YUfbYf  
[ fci d'

⇒Ybh]ZniU'WcfY''YUfbYf[ fci d'Zca 'h'cgY'fYgYUFWX'Xi f]b[ 'h.]g'Wci fgY''F YgYUFWX'UbX'XYg][ b'U'fuf[ YhX  
'h'fUWngi ddcfhdfc[ fUa 'Zcf'h.]g''YUfbYf[ fci d''K f]h'i d'mci f'Ybj ]gU[ YX'dfc[ fUa 'b'h'Y'Zcfa 'cZU  
dfc[ fUa 'dfcdcgU''Mci f'dfcdcgU'g\ci 'X'jbWi XY'h'Y'Z'ck ]b[ 'b]Zcfa Uhcb'.

- % " H\Y'WcbhI h]b'k \]W'h'Y'dfc[ fUa 'k ]''VY'ja d'Ya Ybh'X"
- & " H\Y'gdYW]W]h'fUWmbYYXg'UbX'WU''Yb[ Yg'cZmci f''YUfbYf[ fci d"
- ' " H\Y'dfc'YW'X'ci h'W'a Yg'cZmci f'dfc[ fUa "
- ( " H\Y'h'Yc'fYh]W'fU]cbU'Y'Zc'f'mci f'dfc[ fUa "
- ) " H\Y'XYg][ b'UbX'g'fi W'i f'Y'cZmci f'dfc[ fUa "
- \* " H\Y'fYgci f'W'g'UbX'd'YfgcbbY''b'Y'X'Y'X'Zc'f'mci f'dfc[ fUa "
- + " H\Y'k'Um] ]b'k \]W'h'Y'Z'Z'W]j YbYgg'cZmci f'dfc[ fUa 'Wb'VY'a YUgi fYX"

F Ya Ya VYf'hc'W]h'Uddfcdf]U'h''h'fUhi fY'zi g]b[ '5D5 '\*h'Wcbj Ybh]cbg

Hi fb]h]b'gYh]b[ . H\]g'Ugg][ ba Ybh]g'gi Va ]h'X'h'fci [ \ 'Hi fb]h]b'UbX'gh XYbh]Wb'gY'Hi fb]h]b'g]a ]Uf]m  
fYdcf'g"

I BGK 'G7 < CC @ 'C: '98I 75H€B 'FI 6F ⇒ # 998657? 'G < 99H'

98GH) ( ) (

5ggYgga YbhHUG\_ 'DfYgYbhHjcb

GdYWZJW7 f]hYfJU	''flŁ—————2fŁŁ			
I bXYfghUbX'cZħY'ei Ygh]cb'cf']ggi Y'UbX'hY'_'YmWcbW'dhg ]bj'c'j YX				
8Ydħ'cZUbUm]g'UbX#f'W]hei Y' ]b'fYgdcbgY'hc'hY'hUg_				
: Ua ]'Uf]m]k ]ħ'UbX'fY'Yj bW'cZdfcZYgg]cbU'UbX#f'fYgYUfW ']hYfUhi fY'i gYX'hc'gi ddcfhfYgdcbgY				
Għfi Wħi fY'UbX'cf[ Ub]nUh]cb'cZfYgdcbg				
DfYgYbhHjcb'cZfYgdcbgY'UW'cfX]b[ 'hc'Uddfcdf]Uħ'UWUXYa ]WUbX ']b[ i ]gh]W'cbj Ybh]cbg				
; YbYfU'Wca a Ybh]fYWca a YbXUH]cbg'Zcf'bYI h]ja Y.'				

@Yħi fYf

F YWca a YbXYX.' ' '\$'fl @DG'7F '8B' < 8Ł'

k Y][ \h]b[ ' . &\$i

'B 6. ħ.]g'h]W\_g]b'hY'j Uf]ci g'Vcl Yg'UbX'XYg][ bYX'hc'dfcj ]XY'ZYXVUW'hc'gh'XYbhg/hYmUfY'bch[ ]j Yb  
 Yei U'k Y][ \h]b'XYħfa ]b]b[ 'ħY'fYWca a YbXYX'[ fUXY" 8YdYbX]b[ 'cb'ħY'bUhi fY'cZħY'UggYgga YbhHUG\_ž  
 'Yħi fYfg'a UmU'gc'WcbYI ħi U']nY'UbX#cf'Ua YbX'ħYgY'gdYWZJWf]hYfJU" 'H\Y'fYWca a YbXYX'[ fUXY:]g  
 ħYbhHj] Y'cb'mžgi Va 'Yħi'hc'gh]bXUfX]gUh]cb'dfcWYggYg'UbX'Uddfcj U'VmħY'GWX'cc'cZ9Xi WUh]cb  
 @YUfb]b[ 'UbX'HYUW]b[ '7ca a ]ħY"





Gi Va ]gg]cb`cZ5ggYgga YbhHUg\_g

Gh XYbng`UfY`YI dYW`X`hc`di h`h`Y]f`bUa Yg`UbX`gh XYbhbi a VYfg`cb`Yj YfmdU[ Y`cZ`h`Y]f`Ugg][ ba Ybhg"

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

- K cf\_`gi Va ]hYX`%\$`hc`%-`XUmg`UZhYf`h\Y`gh]di``UhYX`XYUX`]bY



- i bXYfghUbx'mci f'f][ \hg'UbX'fYgdcbg]V] ]hYg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[ ]Uf]ga ž'Wc'dmf][ \hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5W'W'dhUV'Y'I gY'cZ  
I BGK '⇒H'F'Ygci f'W'g'Dc`]W'h
- VY'Uk UfY'cZ'Y'ghUbxUfXg'cZVY\Uj ]ci f'YI dY'W'X'cZYj Yfmcby' ]b'hY'I BGK 'W'a a i b]m
- `cW'W'h'gYfj ]W'g'UbX' ]bZ'fa U]cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZ'Y'gY'UfY'Ug'k ]`VY'ZJa ]]Uf'hc'mci ž'c'hYfg'k ]`VY'byk "; U]b]b[ 'U'gc`X'i bXYfghUbx]b[ 'cZU`'hY  
fY'UH'X'UgdY'W'g'cZ9@G9'k ]`'Y'd'mci 'a U\_Y'hY'a cghcZmci f'gh X]Yg'Uhl BGK "  
f\hd.#gi.V'Y'W'f'i ]XYg" ]VfUfm'i b'gk "YXi "Ui #' ]gY#UVci h' ]gYt

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

5`Wc`YW]cb`cZfYUX]b[ g`gY`YW]X`Zcf`h]g`Wci fgY`k ]`VY`d`UW]X`cb`A`ccX`Y`" `h]g`YI`dYW]X`h`Uhighi`XYbh]k`k ]`  
dfYdUfY`Zcf`YUW]`YW]i`fY`UbX`hi`hcf]U`VmWca`d`Yh]b[ `h`Y`fYUX]b[ g`dcgh]X`Zcf`YUW]`k`YY`\_`cZ`h`Y`Wci`fgY`"

F YWca a YbXYX`F Ygci fWg

6nfbYgZ`D`"/`K`Ug]\_`Z`6`"f&\$\$,`L`">S`YgSYWS`V`>[fW]Suk`6`WhWab`\_`W`f`,`I`ZSf`7VgUSfadc`@WWW`fa`=`ai`"  
;`i`]XZcfX`DfYgg`"

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

Øf]YZmci`h]bY`\\ck`'ghi`XYbhZYXVUW`\_`f]Vch`Zcfa`U`UbX`]bZcfa`U`E`cb`h`Y`Wci`fgY`k`k ]`VY`[`Uh`YfYXz`\\ck`]h`  
k`k ]`VY`UbU`mgYX`UbX`\\ck`]hk`k ]`VY`UW]X`i`dcb`h`c`]a`dfcj`Y`h`Y`'ghi`XYbh`YUfb]b[ `YI`dYf]YbW]":`cf`YI`Ua`d`Yz`  
mci`'a`][`\\hX]gW`gg`k`\\Uhk`Ug`]XYbh]ZYX`]b`dUghZYXVUW`\_`UbX`\\ck`'h]g`Wci`fgY`k`Ug`W]Ub[`YX`h`UXXfYgg`h`Y`  
]ggi`Y`Q`

⇒ U[ Y`7`fYX]h

GmbYf[ ]Yg`]b`Gci`bX`&\$%\*`

7F ⇒ CG

7F ⇒ CG`Dfcj`]XYf`7`cXY`.\$\$\$`-`,`;`