

MINE3910

GcW!c!9bj]fcba YbU`5gdYWg`cZA]b]b[

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

GWcc`cZA]bYfU'g/`9bYf[mF Ygci fWg`9b[]bYf]b[`#`I BGK`9b[]bYf]b[



7ci fgY'8YHU]`g

7fYX]hDc]bHg`*`

Gi a a UfmicZhY'7ci fgY

H\]g`Wci fgY`dfcj]XYg`U`Wca dfY\Ybg]] Y`UbX`dfUW]W]i bXYfgHUbX]b[`cZhY`ja dUWg`Vch`dcg]h] Y`UbX`bY[Uh] Y`hUha]b]b[`a Um\Uj Y`cb`gcW]YmUbX`hY`Ybj]fcba Ybh`C b`Wca d`Yh]cb`cZh]g`Wci fgY`Z`gh XYbhg`g\ci `X`VY`UV`Y`hc]XYbh]Zn`UbU`mgY`UbX`Udd`mghU]h`!cZhY!UfhY`Wk]jei Yg`]b`Ybj]fcba YbhU`a UbU[Ya Ybh`cZa]bY`g]hYg`Ug`k`Y`Ug`]XYbh]Zn`hY`a U`cf`]ggi Yg`UbX`a UbU[Ya YbhgfU]h []Yg`UggcW]U]hX`k]h`gcW]U`#Wca a i b]m]a dUWg`cZa]b]b[`]b`5i gfU`]U`UbX`]bhYfbU]h]cbU`m`

C b`Wca d`Yh]cb`cZhY`Wci fgY`Z`hY`gh XYbhg\ci `X`VY`WdUV`Y`cZXYa cbghfU]h]b[`Ub`i bXYfgHUbX]b[`cZ

- @Y[U`/`dc`]h]W]`WcbhYI hcZa]b]b[`]b`5i gfU`]U`
- Df]bW]d`Yg`cZGi gh]bUV`Y`8Yj Y`cda Ybh`
- 7ca dUbm]VUgYX`]b]h]Uh] Yg`]b`Ybj]fcba YbhU`a UbU[Ya Ybh`
- GHU]`cZhY`UfhY`Wk]jei Yg`]b`Ybj]fcba YbhU`a UbU[Ya Ybh]cZa]bY`g]hYg`
- A U`cf`]ggi Yg`UggcW]U]hX`k]h`gcW]U`#Wca a i b]m]a dUWg`cZa]b]b[`]b`5i gfU`]U`UbX`]bhYfbU]h]cbU`m`

7ci fgY'5]a g

H\]g`Wci fgY`U]a g`hc`dfcj]XY`U`Wca dfY\Ybg]] Y`UbX`dfUW]W]i bXYfgHUbX]b[`cZhY`ja dUWg`Vch`dcg]h] Y`UbX`bY[Uh] Y`hUha]b]b[`a Um\Uj Y`cb`gcW]YmUbX`hY`Ybj]fcba Ybh`

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

5Zf`gi W]ggZ `mWca d`Yh]b[`h]g`Wci fgY`Z`mci `g\ci `X`VY`UV`Y`hc`.

@YUfb]b[`Ci hWca Y	95`GHU[Y`%7ca dYh]bW]Yg
%`8Ya cbghfU]h`U`_bck`YX[Y`cZhY`Y[U`z`dc`]h]W]`/`Yh]W]`WcbhYI hcZa]b]b[`]b`5i gfU`]U`UbX`c] YfgYUg`	D9%`*`zD9&(`zD9` "%zD9` "("
&`8YgW]VY`UbX`Udd`mhY`df]bW]d`Yg`cZGi gh]bUV`Y`8Yj Y`cda Ybh`	D9%`*`zD9&(`zD9` "%
'`" =>Ybh]Zn`UbU`mgY`UbX`Udd`mghU]h`cZhY`UfhY`Wk]jei Yg`]b`Ybj]fcba YbhU`a UbU[Ya Ybh]cZa]bY`g]hYg`	D9%`" zD9&(`zD9` ""
(`" =>Ybh]Zn`hY`a U`cf`]ggi Yg`UbX`a UbU[Ya YbhgfU]h []Yg`UggcW]U]hX`k]h`gcW]U`#Wca a i b]m]a dUWg`cZa]b]b[`]b`5i gfU`]U`UbX`]bhYfbU]h]cbU`m`	D9` "%zD9` "&zD9` "**

HYUWX]b[`GhfU]h []Yg`

: ci f`WcbhU]h\ci fg`k]`VY`i`h]`gYX`Zc`f`Y`W]i`fYg`UbX`]b!WUgg`UW]h]`h]Yg`UbX`UggYgga Ybhg`

@YUfb]b[/`HYUWX]b[`A UbU[Ya YbhGmg]hYa`f@HA GŁ`H\Y`@YUfb]b[/`HYUWX]b[`A UbU[Ya YbhGmg]hYa`f@HA GŁ`i`gYX`k]h`h]g`Wci fgY`]g`UVW]ggYX`Uh`

Gi ddcfha UHf]U`Zcf`h]g`Wci fgY`]bWi X]b[žWcd]Yg`cZ`YWi fY`bchYgžfYWca a YbXYX`fYUX]b[gžUgg][ba YbHg
UbX`fYgi`hg`Zcf`Ugg][ba YbHg`YHWk`YbYj`Yf`Uj`U]UV`Y`WUb`VY`Zci`bX`]b`@HA`G`"
5`WcfYgdcbXYbW`g`ci`X`VY`i`bXYfU`Yb`i`g]b[`h`Y`Ya`U]`ZUW`]mk`]h`]b`@HA`G`"
7`Ub[`Yg`]b`h`Y`YWi`fY`gWYXi`YžgYa`]bUfgžk`cf`g`cdg`UbX`Ugg][ba YbhXUH`g`k`]`VY`dcgh`X`cb`h`Y
7`U`YbXUf`]b`@HA`G`"

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!WUgg'UWj]hYg'	&\$!	Bch5dd]WUVY	%ž&ž' ž(
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A U`cf; fci d'5gg][ba Ybh	' \$!	K YY_%\$	%ž&ž' ž(

5ggYgga Ybh8YHU]`g

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8YHU]`g.

; YbYFU`mghi XYbhk ci `X'bYYX`hc`YI d`cfY`UbX`UbU`mgY`hY`[] Yb`hc d]Wg`UbX`]bX]j]Xi U`mdfcj]XY`U`k f]HYb fYgdcbgY`hc`hY`[] Yb`ei YfmUhihY`YbX`cZ`hY`UWj]]mZ`fYj U`i Uh]cb"

5ggYgga Ybh& !WUgg'E i]n

8YHU]`g.

!WUgg`ei]nnYg`k]`hYghhY`i bXYfgHUbX]b[`cZ`hY`a UHf]U`dfYgYbHYX`h`"XUH"; YbYFU`Zcfa UhcZ`hY`ei]nnYg`k]`VY`U`Wta V]bUh]cb`cZa i`h]d`Y`Wk]W`ei Ygh]cbg`UbX`g`c`fhfYgdcbgY`ei Ygh]cbg`fYei]fYX`hc`VY`gi Va]HYX`]b`U`dfY!XYZ]bYX`Xi fUH]cb"

5ggYgga Ybh' . 6`c[

8YHU]`g.

&6`c[`Ybh]Yg`fUddfcl]a UH`m(\$\$`k`cfXg`YUWX`E`cb`W`cbhYa`dcfUfmgcW]c!Ybj]fcb`a`YbHU`]ggi Yg`"D`i`g`&6`c[fYZYW]cbg`fUddfcl]a UH`mC`B`9`dUfU[fUd`Y`UWX`E`": i`fhYf`XYHU]`g`k]`VY`Uj U]UV`Y`UhihY`h]a`Y`cZ`hY`Ugg][ba YbhfY`YUgY"

5ggYgga Ybh(. A U`cf; fci d'5gg][ba Ybh

8YHU]`g.

9UWX`[fci d`fYei]fYg`hc`dfYdUfY`hk`c`d]YWW`g`cZUggYgga YbhZ`U`dfc[fYgg`fYdcfh]b`hY`Zcfa`cZU`GYa]bUf dfYgYbHU]cb`k`Y][\]b[`%\$! `UbX`U`Z]bU`k`f]HYb`fYdcfhf) \$\$`k`cfXg`E`k`Y][\]b[`&\$! "

F Ygci fWg

F YWca a YbXYX'F Ygci fWg

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

- I BGK '@YUfb]b['7YbfY!' k k k "Wi bgk "YXi "Ui
- 7 ci bgY``b['gi ddcfh! k k k "Wti bgY``]b["i bgk "YXi "Ui

9ei]HUV`Y`@YUfb]b['GYfj]Wg

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

Mci f`YWh fYf`UbX`hY`l b]j Yfg]mi k]`Yl dYWhmci f`gi Va]hYX`Ugg][ba Ybht`UfY`hfi`mimci f`ck b`k cf`"l BGK
`Ug`j YfmWYUf`[i]XY`bYg`cb`k `Uhd`U[]Uf]ga]g`UbX`ck`hc`Uj`c]X`]h`D`U[]Uf]ga]g`i`g]b[`hY`k`cfXg`cf
]XYUg`cZchYfg`UbX`dfYgYb]b[`hY`a`Ug`mci f`ck b`"D`U[]Uf]ga]g`U`mdY`cZ]b]h`YWh`U`hY`Z`h`W]b`hU`Y
a`UbmZcfa`gZ`Zca`XY`]VYfU]h`VX`YU]b[`hc`UW]XYb]U`miW`dm]b[`Zca`U`gci`fW`k`]h`ci`hUW`bck`YX[`Ya`Yb]h`
H`Y`l b]j Yfg]mi`Ug`UXcdhX`Ub`YXi`W]h]`Y`UddfcUW`hc`d`U[]Uf]ga`UbX`Ug`XYj`Y`cdYX`U`fUb[`Y`cZ
fYgci`fW]g`hc`gi`ddcfh]h`XYb]h]"5`"hY`XYhU]g`cb`d`U[]Uf]ga`Z]b]W`X]b[`gca`Y`i`gY`Z`"fYgci`fW]gZ`W]b`VY
Zci`bX`Uh`[k`k`k`"gh`XYb\]h`i`bgk`"YXi`"Ui`#d`U\[\]Uf\]ga`](#)

5 WUXYa]W#Zcfa Uh]cb

7 ci fgY`F Ygi `hg

: cf`XYHU]g`cb`l BGK `UggYgga Ybhd`Wzd`YUgY`j]g]h [k k k "gh XYbhi bgk "YXi "Ui #UggYgga Ybh](#)

#`gca Y`]bghUbWg`mci f`Z]bU`Wci fgY`fYgi `ha UmVY`k]H\Y`X`UbX`bchfY`YUgYX`cb`hY`l BGK `d`UbbYX`XUH`" H\]g`]g`]bX]WUHX`VmU`Wci fgY`[fUXY`fYgi `hcZY]hYf.

- VfcUXVUbX`WcbbYWjcb`f&) *`_V]hgYWcf`ZJghYfŁ
- UV]`]mhc`j`Yk`ghfYUa`]b`[`j`XYc`fŁ][`\\`cf`ck`XYZ]b]hcb`I`BGK`HJ`cdh]cbgŁ

A cfY`]bZcfa`Uhcb`UVci`hgmgHya`fYei`JfYa`YbHg`]g`Uj`U]UV`Y
[Uhi k k "ghi XYbhi bgk "YXi "Ui #a ccX`Y!gmghYa`lfYei`JfYa`YbHg](#)

5VWYgg]b[`7ci fgY`A UHYf]U`g`H\ fci [\ `A ccX`Y

7ci fgY`ci`h]bYgZgi`ddcfha`UHYf]U`g`UFY`i`d`cUXYX`hc`A`ccX`Yz`hY`i`b]j`Yfg]mghUbxUfX`@YUfb]b[
 A`UbU[`Ya`YbhGmgHya`f@a`GŁ`#`UXX]hcbz`cb!`]bY`Ugg][`ba`Ybhgi`Va`]gg]cbg`UFY`a`UXY`i`g]b[`hY`
 Ugg][`ba`YbhXfcdVcl`ZUW]`]midfcj`]YX`]b`A`ccX`Y`"5`"Ybfc`"YX`gh`XYbhg`UFY`Ui`hca`UHW`"m]bW]`YX`]b`
 A`ccX`Y`Zc`f`YUW`Wc`i`fgY`"Hc`UWVY`gg`hY`gY`XcW`a`Ybhg`UbX`ch`hY`f`Wc`i`fgY`fY`gci`fW`gZ`d`YU`gY`j`]g]h`
[k k k "a ccX`Y`"h`"hi`bgk`"YXi`"Ui`](#)

<ck`K`Y`7`cbhUWh`Mci

5hi]a`YgZ`hY`GW`cc`"cf`mci`f`Wc`i`fgY`Wc`bj`Ybcfg`a`Umb`YX`hc`Wc`bhUWh`mci`UVci`hmc`i`f`Wc`i`fgY`cf`mci`f`
 Ybfc`a`Ybh`Mci`f`Wc`i`fgY`Wc`bj`Ybcfg`k`]`i`gY`hY`Ya`U]`Z`bW]cb`k`]h]b`A`ccX`Y`cf`k`Y`k`]`Wc`bhUWh`mci`cb`
 mci`f`4`gh`XYbhi`bgk`"YXi`"Ui`Ya`U]`UXXfYgg"

K`Y`i`bXYfghUbx`h`Uhmc`i`a`Um`Uj`Y`Ub`YI`]gh]b[`Ya`U]`UW`Wc`i`bhUbx`k`ci`X`dfYZf`Zc`f`mci`f`I`BGK`Ya`U]g`hc`
 VY`fYX]fYWYX`hc`mci`f`dfYZf`fYX`UW`Wc`i`bh`D`YUgY`gYY`]bg]fi`W]cbg`cb`ck`hc`fYX]fYW`mci`f`I`BGK`
 Ya`U]g`" "<ck`WUb`#Zc`fk`UfX`a`mYa`U]g`hc`Ubc`h`Y`f`UW`Wc`i`bfB"

<ck`Mci`7`Ub`7`cbhUWh`I`g

K`Y`UFY`U`k`Umg`fYUXmhc`Ugg]ghmci`k`]h`mci`f`]bei`]f]Yg`"Hc`Ybgi`fY`mci`f`ei`Ygh]cb`]g`X]fYWYX`hc`hY`Wc`ffYWh`
 dYfgcbZ`d`YUgY`i`gY`hY`Ya`U]`UXXfYgg`VY`ck`Zc`f.

- 9bfc`a`Ybhcf`ch`hY`f`UXa`]b`ei`Ygh]cbg`fY`[`UfX]b[`mci`f`dfc`[`fUa`.
[\hdg.# bgk \]bg\[\h'a \]fcgcZ\]Wfa dcfU`g`Wca`#k`YV!Zcfa`g#](#)
- 7ci fgY`]bei`]f]Yg`g\ci`X`VY`X]fYWYX`hc`hY`7`ci`fgY`7`cbj`Ybcf`

⇒ U[`Y`7`fYX]h

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5W_bck`YX[Ya YbhcZ7ci blfm

5ddYbX]l . '9b[]bYYfg'5i ghfU`U'f95Ł'DfcZYgg]cbU`'9b[]bYYf'7ca dYhYbWm
GHUbXUfX

Dfc[fUa ' bHYbXYX'@YUfb]b['Ci hWta Yg	
? bck `YX[Y'UbX'g_]`VUgY	
D9%"%7 ca dfY\Ybg]j YžhYcfmVUgYX'i bXYfghUbX]b['cZhY'i bXYfd]bb]b['bUh fU`UbX d\mg]WU`gWYbWg'UbX'hY'Yb[]bYYf]b['Z bXUa YbHU'g'Udd`]WUV'Y'hc'hY'Yb[]bYYf]b['X]gWd`]bY	
D9%"&'7 cbWdh U`i bXYfghUbX]b['cZhY'a UhYa Uh]Wgžbi a Yf]WU`UbU'mg]gžghUhgh]WgžUbX Wta di hYf'UbX']bZcfa Uh]cb'gWYbWg'k \]W' i bXYfd]b'hY'Yb[]bYYf]b['X]gWd`]bY	
D9%" " b!XYdh'i bXYfghUbX]b['cZgdYWU`]ghVcX]Yg'cZ_bck `YX[Y'k]h]b'hY'Yb[]bYYf]b[X]gWd`]bY	
D9%"('8]gWfba YbhcZ_bck `YX[Y'XYj Y`cda YbhUbX'fYgYUfW'X]fYW]cbg'k]h]b'hY Yb[]bYYf]b['X]gWd`]bY	
D9%") ? bck `YX[Y'cZYb[]bYYf]b['XYg][b'dfUW]W'UbX'WcbHYI h U`ZUWc'fg]a dUW]b['hY Yb[]bYYf]b['X]gWd`]bY	
D9%"* 'i bXYfghUbX]b['cZhY'gWc'dYždf]bWd`Ygžbcfa gžUW]c' bHUJ']h]Yg'UbX'Vci bXg'cZ gi gh]bUV'Y'Yb[]bYYf]b['dfUW]W']b'hY'gdYW]ZWX]gWd`]bY	
9b[]bYYf]b['Udd`]WUh]cb'UV`]jm	
D9%"%5dd`]WUh]cb'cZYghUV`]g\YX'Yb[]bYYf]b['a YhlcXg'hc'Wta d'YI'Yb[]bYYf]b['dfcV'Ya gc`]b[
D9%"&'&'i YbhUdd`]WUh]cb'cZYb[]bYYf]b['hYW]b]ei Ygžhc'c'g'UbX'fYgci fW'g	
D9%" " '5dd`]WUh]cb'cZgmg]Ya Uh]WYb[]bYYf]b['gmbhYg]g'UbX'XYg][b'dfcW'ggYg	
D9%"('5dd`]WUh]cb'cZgmg]Ya Uh]WUddfcUW]Yg'hc'hY'WcbXi W]UbX'a UbU[Ya YbhcZYb[]bYYf]b[dfc'YW]g	
DfcZYgg]cbU`UbX'dYfgcbU`Uhf]Vi hYg	
D9' "%9h]WU`WcbXi W]UbX'dfcZYgg]cbU`UW]c' bHUJ']jm	
D9' "&'9ZYW]j Y'cfU`UbX'k f]hYb'Wta a i b]WUh]cb`]b'dfcZYgg]cbU`UbX`UmXca U]bg	
D9' " '7fYUh]j Yž]bbcj Uh]j Y'UbX'dfc!UW]j Y'XYa YUbcif	
D9' "('DfcZYgg]cbU`i gY'UbX'a UbU[Ya YbhcZ]bZcfa Uh]cb	
D9' ") 'C fXYfma UbU[Ya YbhcZgY'ž'UbX'dfcZYgg]cbU`WcbXi W]	
D9' "*" '9ZYW]j Y'hYUa 'a Ya VYfg\]d'UbX'hYUa ``YUXYfg\]d	