

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'8YHJ`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]`WcbhY] 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]`WcbhY] 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` "**

HYUW]b[`GhfU]h []Yg`

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

@YUfb]b[/`HYUW]b[`A UbU[Ya Ybh]Gmg]hYa`f@HA GŁ`H\Y`@YUfb]b[/`HYUW]b[`A UbU[Ya Ybh]Gmg]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[ž`Wcd]Yg`cZ`YWi fY`bchYgžfYWca a YbXYX`fYUX]b[gž`Ugg][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`Yž`gYa`]bUfgž`k`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 Ybh8YHJ]`g

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8YHJ]`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"

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!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[

8YHJ]`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`XYHJ]`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

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9UWX`[fci d`fYei]fYg`hc`dfYdUfY`hk`c`d]YW]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`h\Y`I b]j Yfg]mi k]`YI dYWhmci f`gi Va]hYX`Ugg][ba Ybht`UfY`hfi`mimci f`ck b`k cf`"I 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`dfYgYbht]b[`h\Ya`Ug`mci f`ck b`"D`U[]Uf]ga]g`U`hmdY`cZ]bht`YWh U`h\YZh`hWUb`hU`Y
a UbmZcfa gZ`Zca`XY`]VYfUhr`WXYUht]b[`hc`UW]XYbhu`miW`dm]b[`Zca`U`gci fW`k]hci hUW`bck`YX[Ya Ybht
H\Y`I b]j Yfg]mi`Ug`UXcdhX`Ub`YXi Wht] Y`UddfcUW`hc`d`U[]Uf]ga`UbX`\Ug`XYj Y`cdYX`U`fUb[Y`cZ
fYgci fW`g`hc`gi ddcfghi XYbht]"5`h\Y`XYhu]g`cb`d`U[]Uf]ga ž]bWi X]b[`gca Y`i`gYZ`fYgci fW`gZ`WUb`VY
Zci bX`Uh [k k k "gh XYbht i bgk "YXi "Ui #d`U\[\]Uf\]ga](#)

5 WUXYa]W#Zcfa Uh]cb

7 ci fgY`F Ygi `hg

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#`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`hgmgH`a`fYei`]fYa`YbHg`]g`Uj`U]UV`Y
[Uhi k k "ghi XYbhi bgk "YXi "Ui #a ccX`Y!gmghYa`lfYei`\]fYa`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`YbhGmgH`a`f@a`GŁ`"b`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`Zcf`YUW`Wci`fgY`"Hc`UWVY`gg`hY`gY`XcW`a`Ybhg`UbX`ch`hYf`Wci`fgY`fYgci`fW`gZ`d`YUgY`j`]g]h`
[k k k "a ccX`Y`"h`"hi`bgk`"YXi`"Ui`](#)

<ck`K`Y`7cbhUWh`Mci

5hi]a`YgZ`hY`GW`cc`"cf`mci`f`Wci`fgY`Wcbj`Ybcfg`a`UmbYYX`hc`WcbhUWhmci`UVci`hmcI`f`Wci`fgY`cf`mci`f`
 Ybfc`a`Ybh`Mci`f`Wci`fgY`Wcbj`Ybcfg`k`]`i`gY`hY`Ya`U]`Z`bW]cb`k`]h]b`A`ccX`Y`cf`k`Y`k`]`WcbhUWhmci`cb`
 mci`f`4`gh`XYbhi`bgk`"YXi`"Ui`Ya`U]`UXXfYgg"

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

<ck`Mci`7Ub`7cbhUWh`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`Zcf.

- 9bfc`a`Ybhcf`ch`hYf`UXa`]b`ei`Ygh]cbg`fY`UfX]b[`mci`f`dfc[`fUa`.
[\hdg.##`bgk`\]bg\]\[`h`a`\]f`cgc`Z`W`a`dc`f`U`g`W`a`#`k`YV!`Z`c`f`a`g`#`](#)
- 7ci fgY`]bei`]f]Yg`g`l`ci`X`VY`X]fYWYX`hc`hY`7ci fgY`7cbj`Ybcf`

⇒ U[`Y`7`fYX]h

I`BGK`GMBB9M

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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 'hYbXYX'@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 YbH'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 h'f'UbX']bZcfa Uh]cb'gWYbWg'k \]W' i bXYfd]b'hY'Yb[]bYYf]b['X]gWd`]bY	
D9%" " 'h!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' bHUV]']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']WU]cb'UV']]m	
D9%"%5dd`]WU]cb'cZYghUV]g\YX'Yb[]bYYf]b['a Yh'cXg'hc'Wta d'Yi'Yb[]bYYf]b['dfcV'Ya gc']]b[
D9%"&'&: 'i YbhUdd']WU]cb'cZYb[]bYYf]b['h'W]b]ei Ygžhc'c'g'UbX'fYgci fW'g	
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D9%"('5dd`]WU]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' bHUV']]m	
D9' "&'9ZYW]j Y'cfU`UbX'k f]hYb'Wta a i b]WU]cb']b'dfcZYgg]cbU`UbX`UmXca U]bg	
D9' " '7fYUh]j Yž]bbcj Uh]j Y'UbX'dfc!UW]j Y'XYa YUbc' f	
D9' "('DfcZYgg]cbU`i gY'UbX'a UbU[Ya YbhcZ]bZcfa Uh]cb	
D9' ") 'C fXYf'ma UbU[Ya YbhcZgY'Zi'UbX'dfcZYgg]cbU`WcbXi W]	
D9' "*" '9ZYW]j Y'hYUa 'a Ya VYfg\]d'UbX'hYUa 'YUXYfg\]d	