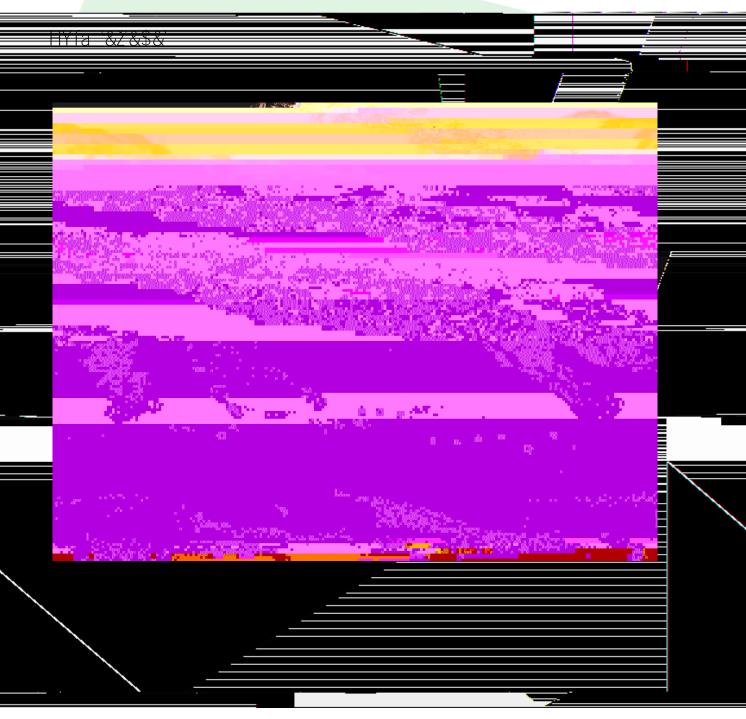
# **MINE9100**

# A]b]b[`8Yg][b`DfUWf]WY



MINE9100 // Term 2, 2023 // published at 31-05-2023 © UNSW Sydney, 2023

Vfl

# 7 ci fgY<sup>-</sup>Cj Yfj ]Yk

### GHJZZ7cbHJWh78YHJ]`g

#### 7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]hm	@cWUh]cb	D∖cbY
7\f]ghcd\`5fbg	<u>WUfbg4 i bgk "YXi "Ui</u>		H9H6 <sup>*</sup> &&\$	Ž*%('(+-+ &'-

#### @Y₩i fYfg

BUa Y	9a U]`	5j U]`UV]`]hm	@cWUh]cb	D∖cbY
={cf`G\]_\cj	][cf"g\] \cj 4 i bgk "YXi "Ui_		H9H6 <sup>*</sup> &&*	

#### GWXcc``7cbHJWhi=bZcfaUhjcb

GW&cc``cZA]bYfU`g`UbX`9bYf[mFYgcifWYg C`X`AU]b`6i]`X]b[ž@YjY``%z`%)-`f?%)Ł IBGK `GM8B9MBGK`&\$)&5IGHF5@=5

: cf`W ffYbhigh XYbhgžU``Ybei ]f]Yg`UbX`Ugg]ghUbW fY`Uh]b[ `hc`Ybfc`a YbhžWUgg`fY[ ]ghfUh]cbždfc[ fYgg]cb WYV<u>Vg</u>`UbX`ch\Yf`UXa ]b]ghfUh]j Y`a UhYfgžd`YUgY`gYY`<u>H\Y`Bi WYi g.`Ghi XYbh<i V</u>"

K YVZ '=a dcfHJbh@]b\_g.' <u>GW&cc^cZA ]bYfU'g'UbX'9bYf[mFYgcifWfg'</u> <u>H\Y'BiWYig'GH XYbh<iV</u> <u>A ccX'Y</u> <u>I BGK '<UbXVcc</u> <u>I BGK 'H]a YHVYY</u> <u>Gh XYbhK Y``VY]b[</u> <u>I f[YbhA YbH)''<YU'h,'Z 'Giddcfh</u> <u>9ei ]HVY'@YUfb]b['GYfj]Wfg</u>

### 7cifgY<sup>·</sup>8YHJ]`g

#### l b]hg cZ7fYX]h\*\*

#### Gi a a UfmcZhXY7ci fgY

8Yg][b'dfUWf]Wf']g'U'Z]bU`'mYUf'Wci fgY']bhYbXYX'hc'YbUV'Y'ghi XYbhg'hc']bhY[fUhY'a UhYf]U`''YUfbh]b'gYj YfU` gi V!X]gW]d`]bYg'cZa ]b]b['Yb[]bYYf]b['''H\Y'cV'YWf]j Y']g'hc'XYj Y`cd'h\Y'ghi XYbhgfigY'Z]X]fYWfYX''YUfb]b[ ž XYg][bž'hYUa k cf\_'UbX'a UbU[Yf]U`'g\_]``g'''H\Y'Wci fgY']bj c`j Yg'i bXYffU\_]b['UbX'Wca d`Yh]b['U'gYf]Yg'cZ XYg][b'HUg\_g']b'a ]b]b['Yb[]bYYf]b['ghfYUa "'9UWX'XYg][b'HUg\_']b'h\Y'gYf]Yg'a UmVY']bXYdYbXYbhcZYUWX

dfc YWrgžk cf\_`]bXYdYbXYbhmUbX`k ]h ]b`U`hYUa žh\Y`XYj Y`cda YbhcZWca a i b]WUh]cb`g\_]``g`UbX`hc`Udd`m WcbhYa dcfUfmgi ghU]bUV`Y`d`Ubb]b[`fh\Ycfm]b`U`dfUWf]WU``g]h Uh]cb"H\]g`Wci fgY`]g`XYg][ bYX`hc`UXXfYgg`h\Y `YUfb]b[`ci hWca Yg`VY`ck`UbX`h\Y`WcffYgdcbX]b[`9b[]bYYfg`5i ghfU`]U`f95Ł`GhU[Y`%7 ca dYhYbWn GhUbXUfXg`Zcf`DfcZYgg]cbU``9b[]bYYfg`Ug`g\ck b`UVcj Y"

### HTYeV4Xdbh[in6bfUBYf[i]40;tegies

H\Y'a U]b'gHUHY[mcZh]g'dfUWf]Wf Wci fgY']g'hc'dfcj]XY'ghi XYbhg'k]h\'cddcfh b]hmZcf'gY'ZX]fYWfYX'YUfb]b[ž dfUWf]W[b['h\Yf'dfcV'Ya ']XYbh]Z]WUh]cb'UbX'gc'j]b['g\_]``gž'Vch\']bX]j]XUi ``mUbX'Ug'U'dUfhcZU'[fci d" Ghi XYbhg'k cf\_]b[']b'dfc'YWhHYUa g'k]``a U\_Y'XYW[g]cbg']b'fY[UfXg'hc'U'VfcUX'fUb[Y'cZhcd]gž'gdYW]Z]Whc a ]b]b['UbX'Wca a cb'Zcf'h\Y'Yb[]bYYf]b['X]gW]d`]bY'Ug'U'k \c`YžY"["'Yb[]bYYf]b['Yh\]Wgž'gcW]cdc`]h]WU'ž Ybj]fcba YbhU``UbX'YWcbca]W]ggi Yg"'5bch\Yf'gHUHY[m]g'hc'YbWci fU[Y'ghi XYbhg'hc'XYjY`cd'UbX'dfUWf]Wf Wca a i b]WUh]cb'UbX'Wc``UVcfUh]jY'g\_]``g"

H\Y'd\]`cgcd\mcZh\]gʻWci fgY`]gʻhcʻdfca chYʻYb[U[Ya YbhUbX`i bXYfghUbX]b[`cZh\Y``YUfb]b[`ci hWca YgʻVm W\U``Yb[]b[`ghi XYbhgʻhcʻgc`j YʻUdd`]YX`UbX`dfUWjWU``fYU``k cf`X`dfcV`Ya g"`H\YfYZcfYžh\Y`Wci fgY`]g ghfi Whi fYX`k]h\`U``Uf[Y`dfcdcfh]cb`cZgY`ZX]fYWhYX`k cf\_`gi ddcfhYX`Vmk cf\_g\cdg`UbX`UggYgga Ybhg ]bhYbXYX`hc`dfca chY`U`XYYd`i bXYfghUbX]b[`cZh\Y``YUfb]b[`ci hWca Yg"`+b`UXX]h]cbž`[i Ygh`YWhi fYg`k]``\Y`d hc`YI dcgY`ghi XYbhgʻhc`fY`Yj UbhgdYWJU`]gh\_bck`YX[Y`UbX`U`gc`fYZfYg\`ghi XYbhg`i bXYfghUbX]b[`cZWcfY XYg][bžWca a i b]WUh]cb`UbX`dfc'YWna UbU[Ya Ybhg\_]``g"

### 5ggYgga Ybh

Hc 'h\Y 'YI HYbh'Uddfcdf]UHY 'Uhi b]j Yfg]hmž'UggYgga Ybhg'k ]``'fYZYWh'\Y '\_]bXg'cZXY`]j YfUV`Yg'YI dYWHX'Uh'\Y dfcZYgg]cbU```Yj Y``]b'gi W\']bXi gHf]Yg'Ug'Ybj ]fcba YbHU``Yb[]bYYf]b[ 'Wcbgi `h]b[ 'UbX'[ cj Yfba Ybh'di V`]W k cf\_g"'H\Y'Z]bU``a Uf\_'Zcf'YUW\'ghi XYbh'k ]``VY'XYHYfa ]bYX'Vm'U'Wca V]bUHcb'cZ]bX]j ]Xi U``UbX'[ fci d WcbHf]Vi Hcbg"'; fci dg'k ]``VY'fYgdcbg]V'Y'Zcf'Ugg][ b]b[ 'fc`Yg'UbX']bX]j ]Xi U``Hug\_g'k ]h\]b'h\Y'HYUa "

9UWX [[fci d'a Ya VYf'k]``VY`UggYggYX`]bX]j ]Xi U``mcb'hY`UVcj Y`fc`Yg`UbX`k]``U`gc`VY`fYei ]fYX'hc`gi Va ]h \]g#\Yf`ck b`UggYgga YbhcZhY`ch\Yf`]bX]j ]Xi U``Wcbhf]Vi h]cbg`k]h\]b`h\Y`[fci d''`Cb'h\Y`VUg]g`cZh\YgY`dYYf Yj U`i Uh]cbg'h\Y`a Uf\_`Zcf`YUWX [[fci d`a Ya VYf'k]``VY`UX↑ghYX`]bhc`Ub`]bX]j ]Xi U``Wcbhf]Vi h]cb'hc`XYhYfa ]bY h\Y`Z]bU``a Uf\_"`H\YfY`k]``VY`bc`k f]hYb'YI Ua ]bUh]cb'cf`ei ]n`]b'h\]g`gi VYWh'5b'ci h]bY`cZh\Y`Wci fgY UggYgga Ybh]g`gYhci hVY`ck ''`8YhU]``cZYUWX UggYgga Ybh]bWi X]b[`h\Y`gi Va ]gg]cb'XUhYža Uf\_g`Ugg][ bYX UbX'h\Y`[YbYfU``Wf]hYf]U`Vmk \]W\`a Uf\_g`UfY`Ugg][ bYX'k]``VY`Zci bX`]b`A ccX`Y`UbX`]b'h\Y`HUY`Y`]b'h\Y UggYgga Ybhcj Yfj ]Yk`gYWf]cb'cZh]g`XcW`a Ybh'`H\Y`Wci fgY`WccfX]bUhcf`fYgYfj Yg'h\Y`f][ \hhc`UX↑ghh\Y Z]bU``gWcfYg`VmgWU`]b[`]ZU[ fYYX`k]h\H\Y`<YUX`cZGW\cc`"

#### 5ggYgga Ybh& Dfc YWhDfcdcgU`

GHJfhXUHY. '% (#\$\*#&\$&' %&\$\$5A 5ggYgga Ybh`Yb[ h\.`a UI ]a i a `) dU[ Yg 8i Y`XUHY. '' \$#\$\*#&\$&' %&\$\$5A

H\]g`]g`h\Y`a U`cf`gi Va ]gg]cb`dYf`hYUa ž`\ck Yj Yf`WcbHU]b]b[``]bX]j ]Xi U``k cf\_`dYf`HUg\_`cf`a U`cf`dfc`YVh Y`Ya YbhdYfZcfa YX`Vm]bX]j ]Xi U``gh XYbhg`YI d`U]b]b[ `XYHU]`g`cZh\Y`XYg][ b`UbX`XYa cbghfUh]b[ `h\Y]f XYW]g]cbg"

#### 5ggYgga Ybh'. 8Yg][bDfYgYbHJh]cb

GhUfh'XUhY. '&, #\$\*#&\$&' '%&\$\$`5A 8D \ulie &Uhu' a&\*e\$+#&\$&' '%&\$\$`5A 8YUX`]bY'Zcf'UVgc`i hY'ZU]`. ''ghi XYbhg'a i ghVY'dfYgYbhcb'h\Y'Xi Y'XUhY

I dcb<sup>-</sup>h Y Wca d'Yhcb<sup>-</sup>cZh Y XYg][ bžYUWX<sup>-</sup>[ fci d'dfYdUfYg<sup>-</sup>U'dfYgYbhUhcb<sup>-</sup>g<sup>-</sup>]XYg<sup>-</sup>a UXY<sup>-</sup>cZ]bX]j ]Xi U<sup>-</sup> Wcbhf]Vi hcbg<sup>--</sup>9UWX<sup>-</sup>gh XYbhk ]<sup>--</sup>VY<sup>-</sup>[ ]j Yb<sup>-</sup>i d<sup>-</sup>hc<sup>-</sup>%)<sup>-</sup>a ]bi hYg<sup>-</sup>hc<sup>-</sup>dfYgYbhUb<sup>-</sup>]bX]j ]Xi U<sup>--</sup>dUfhcZh Y XYg][ b<sup>--</sup> Gh XYbhg<sup>-</sup>UfY<sup>-</sup>YI dYWhX<sup>-</sup>hc<sup>-</sup>X]gd<sup>-</sup>UmU<sup>-</sup>\_bck<sup>-</sup>YX[ Y<sup>-</sup>cZh Y]f<sup>-</sup>hcd]WUbX<sup>-</sup>Wca a i b]WUhY<sup>-</sup>h Y]f<sup>-</sup>Z]bX]b[ g<sup>-</sup>WYUf<sup>-</sup>m<sup>-</sup> : YYXVUW\_<sup>-</sup>cb<sup>-</sup>dfYgYbhUhcbg<sup>-</sup>k ]<sup>--</sup>VY<sup>-</sup>[ ]j Yb<sup>-</sup>Uhh Y YbX<sup>-</sup>cZh Y<sup>-</sup>dfYgYbhUhcb<sup>-</sup>Vm<sup>-</sup>Ub<sup>-</sup>]bj ]h<sup>-</sup>X<sup>-</sup>[ i YghYI dYfh<sup>#</sup> UWUXYa ]WghUZ<sup>-</sup>

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

#### 5ggYgga YbhWf]hYf]U

H\]gi]giU'[fcid'UggYggaYbh/dYYf'YjU'iUh]cb'k]``VY'igYX'hc'XYhYfa]bY'Ub']bX]j]XiU``aUf\_"'9UWX'ghiXYbh k]``VY'aUf\_YX'cb'Vch\`WcbhYbhUbX'dfYgYbhUh]cb'hYW\b]eiY"'GhiXYbhg'UfY'YIdYWhYX'hc'X]gd`UmU \_bck `YX[Y'cZh\Y]f'hcd]WUbX'Wcaaib]WUhY'h\Y]f']bX]b[g'WYUf'm"

# 5 HYbXUbWY FYei ]fYa Ybhg

Ghi XYbhgʻUfYʻghfcb[`mʻYbWci fU[YX'hcʻUhhYbX'U```WUggYgʻUbX'fYj]Yk ``YWhi fYʻfYWcfX]b[g"

### 7 ci fgY GWX YXi `Y

### J]Yk WUgg'ha YHJV`Y

### H]a YHJV`Y'

8 UhY	Hmd Y	7 c bhYbh
K YY_`(.*%-*>i bY*!*&' >i bY	5ggYgga Ybh	5bbcHJHYX^6]V`]c[fUd\m#@]HYfUhifY`F]jYk
K YY_`).`&*`>i bY`!`' \$ >i bY	5ggYgga Ybh	DfcYWiDfcdcgU`
K_YY_``&(`>i`m!`&, >i`m	5ggYgga Ybh	8Yg][b`DfYgYbłUł]cb
GhijUW'+'5i[igh!'%% 5i[igh	5ggYgga Ybh	: ]bU``F Ydcfh

### F Ygci fWfg

#### FYWca a YbXYX FYgci fW/g

ŽE? 7 \_ [`[`YWY[`WWd[`YZS`VTaa] #YX]hYX'VmDYhYf'8Uf']b[ž'&\$%%''GcW]YhmZcf'A]b]b[ž'AYhU``if[mž'UbX 9Id`cfUh]cb`fI "G"Ł'=66B'-+, !\$!, +'')!&\*(!&ž

Ž? 73 DWbadf I d[f[`Y9g[VWXad? [`[`Y7`Y[`WWde"D'<U[Ub'UbX'D'AcfhfA]b]b['9XiWUh]cb'5ighfU`]U fA951±"'f@Uh'ghYX]h]cb'UjU]`UV`Y'Zcf'Xckb`cUX'Zfca'h\Y'GW\cc``kYVg]hY'cf'U`\UfXWcdmjYfg]cb']g'UjU]`UV`Y Zfca'h\Y'IBGK'6cc\_g\cd±"

! <i ghfi `]XžK `UbX'? i WkUžA "ž&\$\$\*" `C dYb D]hA ]bY D`Ubb]b[ / `8Yg][ bž6U`\_Ya UžF chtyfXUa "

! '< Uf[ fUj Ygž 5 'UbX'A Ufh]bž 7 "ž% - ' "`5i glfU`Ug]Ub`7 cU``A ]b]b[ `DfU₩]WY`A cbc[ fUd\`%&ž&bX`9X]h]cbžH\Y 5i g≠A A.`A Y`Vci fbY"

! < Ufha Ubž < "@" &\$\$&" =blfcXi WhcfmA ]b]b[ '9b[ ]bYYf]b[ ž &bX`YX]h]cb" K ]`Ymž BYk `Mcf\_"

! K cY\`YfžF ž< fYXŁź%, \*"`6i`\_`<UbX`]b[`]b`CdYb`D]hA]bYg`UbX`E i Uff]Ygž'HfUbg`HYV&`Di V`]WUh]cbgž 6Yf`]b"

!'FiXYbbcžJ"'&\$\$("'H\Y'A]b]b['JU'iUh]cb'<UbXVcc\_ž&bX'YX]h]cbžKf][\hVcc\_gžA]`hcbžE@8"'=G6B. \$+'%(\$\$+))"

! BcU\_YgžA `UbX`@UbnžHž%--' "`7cghi9gh]a Uh]cb`<UbXVcc\_`Zcf`h\Y`5i ghfU`]Ub`A ]b]b[`=bXi ghfmž A cbc[fUd\`Bc.`&\$#5i ghfU`Ug]Ub`=bgh]h hY`cZA ]b]b[`UbX`A YhU``i f[m'

! 5i g≠A A "@Uf[Y`C dYb`d]h7 cb2YfYbWY GYf]Yg"

! + bh/fbUh]cbU``>ci fbU``cZGi fZUWY`A ]b]b[ 'UbX`F YWUa Uh]cbž`6U`\_Ya U!F chh/fXUa "

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

5 hih Y YbX'cZh Y Wci fgYžU```gh XYbhg'k]```\Uj Y h\Y'cddcfh b]hmhc'Wca d`YhY'U'Wci fgY'Yj U`i Uh]cb'Zcfa " H\YgY'Ubcbma ci g`gi fj Ymg`\Y`d`i g`i bXYfgHUbX'mci f`j]Yk g`cZh\Y'Wci fgYžmci f``YWh fYfg'UbX'h\Y'Wci fgY a UhYf]U`g"'K Y'UfY'Wcbh]bi ci g`m`]a dfcj]b[ `ci f'Wci fgYg'VUgYX'cb'gh XYbhZYYXVUW\_ž'UbX'mci f`dYfgdYWh]j Y ]g`j U`i UV`Y"

K Y'U'gc'YbWci fU[Y'U```gh XYbhg`hc`g\UfY'UbmZYYXVUW\_'h\Ym\Uj Y'Ubmh]a Y'Xi f]b['h\Y'Wci fgY'-`]Zmci \Uj Y'U'WcbWffbž'd'YUgY'WcbhUWfi g']a a YX]UhY`m"

# Gi Va ]gg]cb cZ5ggYgga YbhHUg\_g

H\Y'GW\cc``\Ug'XYjY`cdYX'U'[i]XY`]bY'hc'\Y`d'mci'k\Yb'giVa]hf]b['U'WcifgY'Ugg][baYbh'

K Y`YbWci fU[Y`mci `hc`fYHJ]b`U`WcdmicZYj YfmUgg][ ba Ybhigi Va ]HYX`Zcf`UggYgga YbhZcf`mci f`ck b`fYWcfX Y]h\Yf`]b`\UfXWcdmicf`Y`YWfcb]WZcfa "

5```UggYgga Ybhg`a i gh\Uj Y`Ub`UggYgga YbhWcj Yf`g\YYhUhUWXYX"

# 7 ci fgY Wca d`Yh]cb

7 ci fgY Wca d`Yh]cb`fYei ]fYg`gi Va ]gg]cb`cZU```UggYgga Ybh`]hYa g"`: U]`i fY`hc`gi Va ]h'U```UggYgga Ybh`]hYa g a UmifYgi `h`]b`h\Y`Uk UfX`cZUb`I bgUh]gZUWcfm: U]`i fY`fI : Ł`[ fUXY`Zcf`h\Y`7 ci fgY`i b`Ygg`gdYW]U` Wcbg]XYfUh]cb`\Ug`VYYb`gi Va ]hhYX`UbX`Uddfcj YX"

### @UhY Gi Va ]gg]cb cZUb 5gg][ ba Ybh

: i ```a Uf\_g`Zcf`Ub`UggYgga YbhUfY`cb`mdcgg]V`Y`k \Yb`Ub`UggYgga Ybh]g`fYWf]j YX`Vmh\Y`Xi Y`XUHY''`K cf\_ gi Va ]HYX``UHY`k ]h\ci hUb`Uddfcj YX`YI HYbg]cb`Vmh\Y`Wci fgY`WccfX]bUhcf`cf`XY`Y[ UHYX`Ui h\cf]hm]g`gi VYWh

## Gh XYbhGi ddcfh

H\Y`Lb]jYfg]hmUbX`h\Y`:UW``hmdfcj]XY`U`k]XY`fUb[Y`cZgiddcfhgYfj]WYg`Zcf`ghiXYbhgž`]bWiX]b[.

- @]VfUfmlfU]b]b[ 'UbX'gi ddcfhgYfj ]WYg'! '<u>k k k "`]VfUfm'i bgk "YXi "Ui</u>
- 5WUXYa ]WG\_]``g`Gi ddcfh! <u>`\hhdg.#k k k "gh XYbh'i bgk "YXi "Ui #g</u>]``g
- DgmWkc`c[mUbX`K Y``bYgg'!

### 5WUXYa ]W<cbYghmUbX D`U[ ]Uf]ga

Mci f``YWi fYf'UbX'h\Y'I b]j Yfg]mik]``YI dYWimci f`gi Va]htYX'Ugg][ba Ybhg`UfY'hfi `mmci f`ck b`k cf\_"'I BGK \Ug`j Yfm'WYUf`[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[`h\Y`k cfXg`cf ]XYUg`cZch\Yfg`UbX'dfYgYbh]b[`h\Ya`Ug`mci f`ck b"'D`U[]Uf]ga `]g`U`mdY`cZ]bhY``YWi U``h\YZh''=hWUb`hU\_Y

### 5WUXYa]W=bZcfaUh]cb

# 7 ci fgY FYgi `hg

`

: cf<sup>·</sup>XYHJ]`gʻcbʻl BGK ʻUggYgga Ybhdc`]Whž'd`YUgYʻj ]g]h'<u>k k k "gh XYbh'i bgk "YXi "Ui #UggYgga Ybh</u>

=ðigca Yi]bgHUbWYgimci fiZ]bU``Wci fgYifYgi `ha UmVYik]h\\Y`X`UbX`bchfY`YUgYX`cbih\Y`I\_BGK\_id`UbbYX`XUhY" H\]gi]gi]bX]WUhYX`VmU`Wci fgYi[fUXYifYgi `hicZY]h\Yf. • UV]`]hmihc`j`]Yk`ghfYUa]b[`j`]XYc`f\][\`cf``ck`XYZb]h]cb`IBGK`HJ`cdh]cbgŁ

A cfY`]bZcfa Uh]cb`UVci higmghYa `fYei ]fYa Ybhg`]g`Uj U]`UV`Y Uh<u>k k k "ghi XYbh'i bgk "YXi "Ui #a ccX`Y!gmghYa !fYei ]fYa Ybhg</u>

# $5WW gg]b[^7cifgYAUW f]UgH fci[ AccXY$

7 ci fgY'ci h]bYgžgi ddcfha UhYf]U`gʻUfY'i d`cUXYX'hc'A ccX`Yž'h\Y'i b]j Yfg]hrighUbXUfX'@YUfb]b[ A UbU[ Ya YbhGmghYa 'f@A GŁ'' =b`UXX]h]cbžcb!`]bY`Ugg][ ba Ybhigi Va ]gg]cbg`UfY'a UXY'i g]b[ 'h\Y Ugg][ ba YbhXfcdVcI 'ZUVJ`]hridfcj ]XYX`]b`A ccX`Y'' 5``Ybfc``YX`ghi XYbhg`UfY'Ui hca Uh]VU``m`]bWi XYX`]b A ccX`Y'Zcf`YUVX 'Vci fgY'' Hc`UVWVfgg'h\YgY`XcW a Ybhg`UbX`ch\Yf`Vci fgY`fYgci fWfgžd`YUgY'j ]g]h` <u>k k k "a ccX`Y'hY`h'i bgk "YXi "Ui</u>

FZ[e UagdeWagf?[`WeWfe agf VWeUd[bf[a` aXU'SeeWe Sf fZWVSfWfZW5 agdeWA gf?]`W[e bgT?[eZWVžFZW `SfgdWaXU'SeeWe \_ Sk UZS`YWVgd[`Y fZWFWd\_ SXWdfZW5 agdeWA gf?]`W[e bgT?[eZWVž? aaV WeZag\*V TW Ua` eg fWW Xad fZWgb fa VSfWU'See VWeUd[bf[a` ež ;XfZWdW[e S` k [`Ua` e[efW Uk [` fZWVWeUd[bf[a` aX SUf[h[f[We TWfi VWV fZWG` [hWde[fk f[\_ WfST\*WS` V fZW5 agdeWA gf?]`W/Se gbVSfWW [` ? aaV Wfi fZW VWeUd[bf[a` [` fZW5 agdeWA gf?]`W? aaV WSbb?[Wež

### < ck KY7 cbHJWhMci

5 hhļa Ygžih Y GWL cc``cfimci f Webi fgY Webj Ybefgʻa UmbYYX he WebhUWhimei "UVei himei f Webi fgY cfimei f Ybfe`a Ybh'`Mei f Webi fgY Webj Ybefgʻk]```i gY hLY Ya U]``Z bWh]eb'k]hL]b'A ccX`Y`cf`kY`k]``WebhUWhimei "eb mei f 4 ghi XYbh'i bgk "YXi "Ui 'Ya U]``UXXfYgg"

K Y'i bXYfgHUbX'h\Uhimci 'a Um\Uj Y'Ub'YI ]gh]b[ 'Ya U]`'UWVci bhUbX'k ci 'X'dfYZYf'Zcfimci f'I BGK 'Ya U]`g'hc VY'fYX]fYWYX'hcimci f'dfYZYffYX'UWVci bh''D`YUgY'gYY']bghfi W1]cbg'cb'\ck 'hc'fYX]fYWhimci f'I BGK Ya U]`g.''<u>< ck 'WUb'=Zcfk UfX'a mYa U]`g'hc'Ubch\Yf'UWVci bh3″</u>

### < ck Mci 7Ub 7cbHJWhIg

K Y`UfY`U`k Umg`fYUXmhc`Ugg]ghimci`k]h\`mcif`]bei]f]Yg"`Hc`YbgifY`mcif`eiYgh]cb`]g`X]fYWhYX`hc`h\Y`WcffYWh dYfgcbž'd`YUgY`igY`h\Y`YaU]``UXXfYgg`VY`ck`Zcf.

- 9bfc`a Ybhcf`ch\Yf`UXa ]b`ei Ygh]cbg`fY[UfX]b[`mci f`dfc[fUa.`
  <u>\htdg.## bgk ]bg][\hta ]WfcgcZtWfa dcfhU`g"Wca # YV!Zcfa g#</u>
- 7 ci fgY`]bei ]f]Yg`g\ci `X`VY`X]fYWWYX`hc`h\Y`7 ci fgY`7 cbj Ybcf

### -a U[ Y<sup>·</sup>7 fYX]h

GmbYf[]Yg`]b'GcibX'&\$%\*

7 F *=*7 C G

7F=7CG<sup>.</sup>Dfcj]XYf<sup>.</sup>7cXY<sup>.</sup>\$\$\$-,;

### 5W\_bck `YX[ Ya YbhcZ7ci bhfm

 $\label{eq:constraint} \begin{array}{l} K_{1}^{T}(UW_{bck}^{T}X_{l}^{T}) & K_{1}^{T}(UX_{l}) \\ F(UX_{l}) & F(UX_{l}) \\ F(UX_{l}) & F(UX_{$ 

### 5ddYbX]I. '9b[]bYYfg'5ighfU`]U'f95EDfcZYgg]cbU`'9b[]bYYf'7cadYhYbWm GHJbXUfX

Dfc[fUa +bhybXYX @YUfb]b[ Cihwca Yq ? bck `YX[ Y 'UbX'q\_]``'VUqY D9%"%7ca dfY\Ybq]i Yž'h\YcfmVUqYX'i bXYfqHUbX]b[ 'cZh\Y'i bXYfd]bb]b[ 'bUhi fU`'UbX  $d mg]WU^{g}UbX'hY'Yb[]bYYf]b['Z bXUa YbHU^{g}Udd^WUVY'hc'hY'Yb[]bYYf]b['X]gW[d^bYf]gW[d^bYf]b['X]gW[d^bYf]b['X]gW[d^bYf]b['X]gW[d^bYf]gW[d^bYf]b['X]gW[d^bYf]b['X]gW[d^bYf]b['Y]gW[d^bYf]b['Y]gW[d^bYf]b['X]gW[d^bYf]b['Y]gW[d^bYf]g$ D9%"& 7 cbW/dhiU`i bXYfqHUbX]b[ cZh\Y`aUh\YaUh\WažbiaYf]WU`UbU`mg]qžqHUh]qh\WažUbX Wca di hYf'UbX']bZcfa Uh]cb'gW]YbWYg'k \]W\'i bXYfd]b'h\Y'Yb[]bYYf]b['X]qW]d`]bY D9%" ===!XYdh\ i bXYfqHbX]b[ cZqdYWU`]qhVcX]YqcZ bck YX[Yk]h\]b'h\YYb[]bYYf]b[ X]qWd`]bY D9%"('8]qWFfba YbhcZ\_bck YX[YXY]Ycda YbhUbXfYqYUfWXX]fYWfcbg'k ]h.jb'h.Y Yb[]bYYf]b[`X]gWJd`]bY D9%") ? bck `YX[Y`cZYb[]bYYf]b[ `XYg][b`dfUW]WY`UbX`WcbhYl hi U``ZJW/cfg`]a dUWf]b[ `h\Y Yb[]bYYf]b['X]qWd`]bY D9%"\* 1 bXYfqHJbX]b[ 'cZhXY'qWcdYž'df]bW]d`Yqž'bcfa qž'UWVci bHJV]`]h]Yq'UbX'Vci bXq'cZ qi qHU]bUV`Y`Yb[]bYYf]b[`dfUWfWY`]b`H\Y`qdYWZ]WX]qW[d`]bY 9b[]bYYf]b['Udd`]WUhcb'UV]`]hm D9&"%5dd`]WUhjcb`cZYgHUV`]g\YXYb[]bYYf]b[ 'a Yh\cXg`hc`Wca d`YI 'Yb[]bYYf]b[ 'dfcV`Ya qc`i]b[ D9&"&: `i YbhUdd`]WUhcb'cZYb[]bYYf]b[ 'hYWkb]ei Ygžhcc`g'UbX'fYgci fWfg D9&"' 5dd`]WUhjcb'cZgmghYa UhjWYb[]bYYf]b['gmbh\Yg]g'UbX'XYg][b'dfcWYggYg D9&"( '5dd`]WUhjcb'cZgmghYa UhjWUddfcUWXYg'hc'h,Y'WcbXi WhUbX'a UbU[Ya YbhcZYb[]bYYf]b[ dfc YWg DfcZYgg]cbU`UbX dYfgcbU`Uhf]Vi hYg D9' "%'9h\]WU``WcbXi WhUbX'df]Vi hYa