MERE6002

GY]ga]₩≠a U[]b[



MERE6002 // Term 2, 2023 // published at 26-05-2023 © UNSW Sydney, 2023

VFI

7 ci fgY[·]Cj Yfj]Yk

GHJZZ7cbHJWh78YHJ]`g

7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]m	@cWUh]cb	D∖cbY
Ghi Ufhi7 `Uf_	<u>ghi Ufh'WUf_4 i bgk "YXi "Ui_</u>	J]U ⁻ HYUag ⁻ cf D\cbY	HmfYY`?!<* &%(\$(*,''&+- *

GWXcc``7cbHJWhi=bZcfaUhjcb

GW&cc``cZA]bYfU`g`UbX`9bYf[m`FYgcifWYg C`X`AU]b`6i]`X]b[ž`@YjY``%z`%)-`fP%)Ł I**UB&G\$W`G\$W8DBW9#W**B**K&\$\$%\$\$)\$\$`5|AGH\$F75R%A5_/A**

: cf`W ffYbhigh XYbhgžU``Ybei]f]Yg`UbX`Ugg]gHUbWY`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.`Gh XYbh<i V</u>"`

K YV7 '=a dcfHUbh'@]b_g.' <u>GW&cc``cZA]bYfU`g`UbX`9bYf[mF Ygci fWfg`</u> <u>H\Y`Bi WYi g`Ghi XYbh<i V</u> <u>A ccX`Y</u> <u>I BGK `<UbXVcc</u> <u>I BGK `UbXVcc</u> <u>I BGK `H]a YHUV`Y</u> <u>Ghi XYbhK Y``VY]b[</u> <u>I f[YbhA YbHU``<YU`h`7 `Gi ddcfh</u> <u>9ei]HUV`Y`@YUfb]b[`GYfj]Wfg</u> 7 ci fgY`8YHJ]`g | b]hg`cZ`7fYX]h`*`

- 5\\mathfrac{5}{1} Y``YUfb]b[`!`j]U`cb`]bY`a ccX`Y`U\\mathfrac{1}{1}]h]Yg`UbX`ei]nnYg
- Dfc^{*}YWiVUgYX!`YUfb]b[`k]h`HU_Y!\caY`Ugg][baYbhg`YbWcifU[]b[`]bXighfmlfY`UhYX`h]b_]b["
- 7 UgY'ghi X]Yg``cc_]b[`'Uhih\Y'i gY'cZhYW\b]ei Yg']b'fYU``]bXi ghfmWUgYg'UbX'h\Y'ci hWca Yg'UbX VYbYZ]hg"

FUhjcbU`Y

H\Y`]XYU`]g`fc`]bWfYUgY`f\Y`U`][ba YbficZf\Y`Wci fgY`k]f\`f\Y`I BGK `GWJYbf]U`9Xi WUf]cb`9I dYf]YbWf`Vm Yb\UbW]b[`f\Y`Wca dcbYbficZdfcZygg]cbU``g_]``g`XYj Y`cda Ybfž`]bWfYUgYX`cb`]bY`UWf]j]f]Yg`UbX`dfcj]XY]bWfYUgYX`cddcffi b]f]Yg`Zcf`ZYYXVUW_`fc`gfi XYbfg"`+b`UXX]f]cbž`fc`W\Ub[Y`f\Y`UggYgga Ybfigffi Wfi fY`Zcf dcgf[fUXi UfYg`fc`]bWi XY`Ub`]bX]j]Xi U``fYgYUfV\`dfc`YWfUbX`fYUa !VUgYX``YUfb]b[``Wca dcbYbfg`k \]W\`UfY a cfY`]bXi gffmUi f\Ybf]WUggYgga Ybfg"

5ggYgga Ybh

5ggYgga Ybh'HJg_	K Y][\h	8iY'8UHY	7cifgY`@YUfb]b[CihWcaYgʻ5ggYggYX
%"`Hcd]Wei]nnYg	' \$I	K Y\$\$L`%žK YY_'' ŽK YY_') Ž K YY_'+žK YY_'-	%ž &
&"`:]bU``Wci fgY`YIUa WcjYf]b[`U```Wci fgY`WcbHYbH	' \$I	8i f]b[ˈgW\YXi `YX'YI Ua h]a Y	%ž' &
' "5dd`]WUhjcb91YfWjgYg	(\$1	K YY_`%žK YY_'' žK YY_`) ž K YY_`,	a Y

 1	

>i`m	5ggYgga Ybh	Hcd]Wei]nnYg
K_YY_'%\$." %`>i`m!"(5i[igh	5ggYgga Ybh	

FYgci fWg

DfYgWf]VYX F Ygci fWfg

H\Y'fYUX]b[g'Zcf'YUW\'a cXi `Y'UfY'dfcj]XYX'j]U'<u>@Y[Ubhc'Cb`]bY'GmghYa</u>

H\Y'a U]b'fYUX]b['Zcf'h\Y'Wci fgY']g': <u>UXU``U\`UbX':]g\Yffy'9I d`cfUh]cb': Ycd\mg]W</u>g

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

: YYXVUW_'Zfca 'ghi XYbhg']g'cVhU]bYX'UZhYf'YUWX 'a cXi `Y'UbX'i gYX'hc']a dfcj Y'Z hi fY'a cXi `Yg']b'h\Y'Wci fgY Ug'k Y``Ug'h\Y'Wci fgY']b'`UhYf'mYUfg"

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]hhjb['U'WcifgY'Ugg][baYbh'

K Y`YbWci fU[Y`mci `hc`fYHJ]b`U`WcdmicZYj YfmUgg][ba Ybhigi Va]hHYX`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 Um'fYgi `h']b'h\Y'Uk UfX'cZUb'I bgUh]gZUWcfm: U]`i fY'fI : ½[fUXY'Zcf'h\Y'7 ci fgY'i b`Ygg'gdYW]U` Wcbg]XYfUh]cb'\Ug'VYYb'gi Va]hHYX'UbX'Uddfcj YX"

Gh XYbhGi ddcfh

H\Y'I b]j Yfg]mUbX'h\Y': UW `mdfcj]XY'U'k]XY'fUb[Y'cZgi ddcfhgYfj]Wg'Zcf'gh XYbhgž']bWi X]b[.

- @VfUfmihfU]b]b['UbX'gi ddcfhigYfj]Wfg'! '<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_]``g</u>
- DgmWkc`c[miUbX`K Y``bYgg`! <u>k k k "Wci bgY``]b["i bgk "YXi "Ui</u>

9ei]HUV`Y`@YUfb]b[`GYfj]WYg`U]a g`hc`dfcj]XY`U```gh`XYbhg`k]h\`U`ZYY`UbX`WcbZ]XYbh]U``gYfj]WY`h\Uh dfcj]XYg`dfUWh]WU``gi ddcfhhc`Ybgi fY`h\Uhmci f`\YU`h\`WcbX]h]cb`XcYgbfhiUXj YfgY`mUZYWhmci f`ghi X]Yg"` <u>\hhdg.##qh`XYbh'i bgk "YXi "Ui #Y`g</u>

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

Mci f``YWi fYf`UbX`h\Y`I b]j Yfg]mik]``YI dYWinci f`gi Va]hYX`Ugg][ba Ybhg`UfY`hfi `minci 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[`h\Y`k cfXg`cf]XYUg`cZch\Yfg`UbX`dfYgYbh]b[`h\Ya `Ug`nci f`ck b"`D`U[]Uf]ga `]g`U`mdY`cZ]bhY``YWi U``h\YZh'`+i`WUb`hU_Y a UbmZcfa gž`Zica `XY`]VYfUhY`W\YUh]b[`hc`UVW}XYbhU``mVcdm]b[`Zica `U`gci fWY`k]h\ci hUW_bck `YX[Ya Ybh' H\Y`I b]j Yfg]mi\Ug`UXcdhYX`Ub`YXi WUh]j Y`UddfcUV\'hc`d`U[]Uf]ga `UbX`\Ug`XYj Y`cdYX`U`fUb[Y`cZ fYgci fWYg`hc`gi ddcfhigh XYbhg''`5```h\Y`XYhU]`g`cb`d`U[]Uf]ga ž`]bWi X]b[`gca Y`i gYZ ``fYgci fWYgž`WUb`VY Zci bX`Uhi<u>k k k "gh XYbh'i bgk "YXi "Ui #d`U[]Uf]ga</u>

5WUXYa]W=bZcfaUh]cb

7 ci fgY FYgi `hg

`

: cf[·]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`I_BGK`'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>

$5WW gg]b[^7ci fgYAUhYf]UgH\fci[\AccXY$

7 ci fgY'ci h]bYgžgi ddcfha UhYf]U`gʻUfY'i d`cUXYX'hc'A ccX`Yž'h`Y'i b]j Yfg]mighUbXUfX`@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 'ZJVJ]]midfcj]XYX`]b`A ccX`Y'' 5``Ybfc``YX'ghi XYbhg`UfY`Ui hca Uh]WU``mi]bWi XYX`]b A ccX`Y'Zcf`YUW\`Wci fgY'' Hc`UWWYgg'h`YgY`XcW'a Ybhg`UbX`ch`Yf`Wci fgY`fYgci fW'gž'd`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 fZWVSfWfZW5agdeWA gf? W[e bgT?[eZWZFZW `SfgdWaXU'SeeWe _ Sk UZS`YWVgd`Y fZWFWd_ SXfWdfZW5agdeWA gf? W[e bgT?[eZWZ? aaV WeZag V TW Ua`eg?fWW Xad fZWgb fa VSfWU'See VWeUd[bf[a`ez;XfZWdW[e S`k[Ua`e[efW Uk[`fZWVWeUd[bf[a`aX

5W_bck `YX[Ya YbhcZ7ci bhfm

 $\label{eq:constraint} \begin{array}{l} K_{1}^{*}(UW_{bck}^{*})X_{1}^{*}(V'_{b}Y'_{$

5ddYbX]I. '9b[]bYYfg'5ighfU`]U'f95E'DfcZYgg]cbU`'9b[]bYYf'7cadYhYbWm GHJbXUfX

Dfc[fUa ⁺ŧəhYbXYX`@YUfb]b['CihWcaYg	
?bck`YX[Y'UbX'g_]``VUgY	
D9%"%7cadfY\Ybg]jYžh\YcfmVUgYX`ibXYfgHJbX]b[`cZh\Y`ibXYfd]bb]b[`bUhifU``UbX d\mg]WJ``gW]YbWYg`UbX`h\Y`Yb[]bYYf]b[`ZbXUaYbHJ`g`Udd`]WJV`Y`hc`h\Y`Yb[]bYYf]b[`X]gW]d`]bY	
D9%"&"7cbWYdhiU``ibXYfgHUbX]b['cZh\Y`aUh\YaUh]WgžbiaYf]WU``UbU`mg]gžgHUh]gh]WgžUbX WcadihYf`UbX`]bZcfaUh]cb`gW]YbWYg`k\]W\`ibXYfd]b'h\Y`Yb[]bYYf]b['X]gW]d`]bY	
D9%" `≢o!XYdh\`i bXYfghUbX]b[`cZgdYW]U`]ghVcX]Yg`cZ_bck `YX[Y`k]h\]b`h\Y`Yb[]bYYf]b[X]gW]d`]bY	
D9%"(`8]gWYfbaYbhcZ_bck`YX[Y`XYjY`cdaYbhUbX`fYgYUfW\`X]fYWJcbg`k]h\]b`h\Y Yb[]bYYf]b[`X]gWJd`]bY	
D9%") '? bck `YX[Y`cZYb[]bYYf]b[`XYg][b`dfUWf]WY`UbX`WcbhYIhiU``ZJWfcfg`]a dUWf]b[`h\Y Yb[]bYYf]b[`X]gW]d`]bY	
D9%"*`I_bXYfgHJbX]b[`cZh\Y`gWcdYždf]bW]d`Ygžbcfa_gžUWWci_bHJV]`]h]Yg`UbX`Vci_bXg`cZ gi_gHJ]bUV`Y`Yb[]bYYf]b[`dfUWf]WY`]b`h\Y`gdYW]Z]WX]gW]d`]bY	
9b[]bYYf]b[`Udd`]WUh]cb`UV]`]m	
D9&"%5dd`]WUHjcb`cZYgHUV`]g\YX`Yb[]bYYfjb[`aYH\cXg`hc`Wcad`YI`Yb[]bYYfjb[`dfcV`Ya gc`j]b[