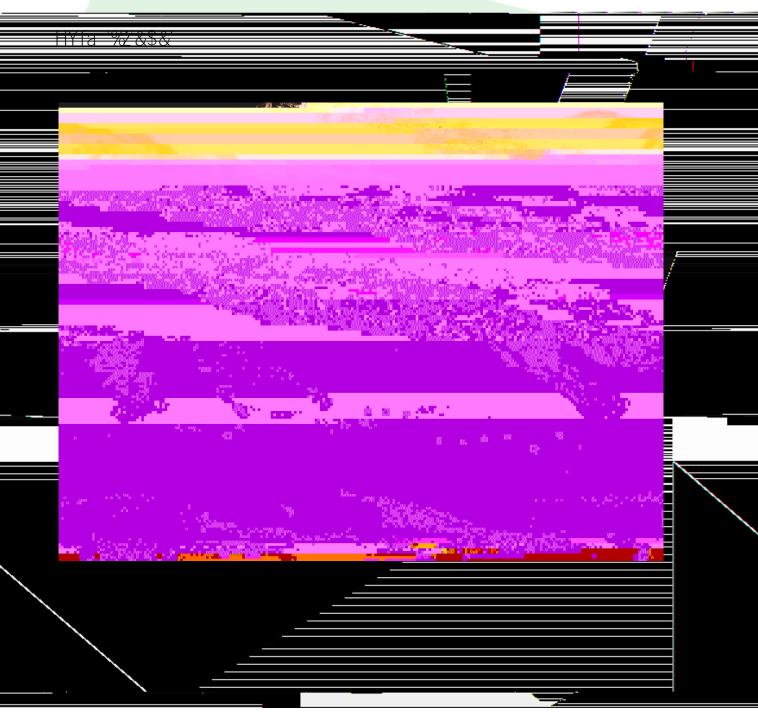
# PTRL3015

# K Y``8f]``]b[ '9ei ]da YbhUbX'CdYfUh]cbg



PTRL3015 // Term 1, 2023 // published at 06-02-2023 © UNSW Sydney, 2023

Vfl

# 7ci fgY<sup>·</sup>8YHJ]`g

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

#### Gi a a UfmcZh\Y'7ci fgY

H\Y'Wci fgY'Wca df]gYg'cZ' 'i b]hg'cZ@YWi fY'UbX'Hi hcf]U``UbX'' 'i b]hg'cZ@UVcfUhcfmik cf\_"

H\Y`YWi fY`]bWi XYg. #JfcXi Wjcb'hc'd\mg]WU`dfcWyggYg`]bj c`j YX`]b'Xf]``]b['c]``UbX`[Ug'k Y``g"'F cHJfm Xf]``]b['f][g'Zcf'VcH\``UbX'UbX'cZg\cfY'cdYfUHcb"'8f]``]b['Yei ]da Ybh']bWi X]b['f]['dck Yf]b['UbX HUbga ]gg]cbž`\c]gh]b[ žfcHJfmgmghYa gž6C D'Yei ]da Ybh'UbX'\cc\_i džXf]```d]dYg'UbX'Wc``Ufg"'8f]``]b['Zi ]X WjfW``Uh]b['gmghYa g`]bWi X]b['di a dgža i X'HUb\_gža i X'a ]I hi fYg'UbX'a i X'WYUbYfg"'9`Ya Ybhg'cZfcW\_ a YW\Ub]Wg'UbX']hg'Udd`]WUh]cb']b'Xf]``]b["'GY`YW]cb'cZXf]``V]hg'UbX'dYbYhfUh]cb'fUhY'cdh]a ]gUh]cb"'F ][ g]n]b['UbX'gY`YW]cb''GdYW]U`a Uf]bY'Yei ]da YbhZcf'cZg\cfY'Xf]``]b["

H\Y``UVcfUhcfmik.cf\_`]bj.c`j.Yg. 'Zcfa i `Uh]cb`cZU`VUg]WXf]``]b[ 'Zi ]X`UbX`WYa YbhZi ffmUbX`XYhYfa ]bY d\mg]WU``UbX`WXYa ]WU``dfcdYfh]Yg"`D\mg]WU``UbX`WXYa ]WU``dfcdYfh]Yg`]bWi XY`XYbg]hmž'j ]gWcg]hmž'Z]`hfUh]cbž U`\_U`]b]mž'UW]X]mž'gc`]X`WcbhYbhgž'UbX`dfYgYbWY`cZc]`ž'k UhYfž'UbX`[UgYg`]b`Xf]``]b[ 'Zi ]Xg"

#### 7 ci fgY<sup>-</sup>5]a g

H\]gʻWcifgY`]gʻHJi[\hZfca`U`dfUWfJWU``j]Yk`k]h\`h\Y`U]a`h\UhghiXYbhgʻk]```YUfb`\ck`hc`ghfYUa`]bY`UbX cdh]a`]nY`f][`cdYfUh]cbgʻUbX`[U]b`h\Y`hYW\b]WU``g\_]``gʻhc`dfcj]XY`WcghiYZZYWf]jY`gc`ih]cbgʻhc`Wcaacb`f][ dfcV`YagʻUggcWJUhYX`k]h\`XUmhc`XUmcdYfUh]cbg"`GhiXYbhg`Ybfc``YX`]b`h\]gʻWcifgY`k]``VY`[]jYb`Ub`]bXYdh\ j]Yk`cZh\Y`d\mg]WU``dfcWfggYg`]bjc`jYX`]b`Xf]``]b[`c]``UbX`[Ug`kY``gžVch\`cb!g\cfY`UbX`cZig\cfY"

#### 7cifgY`@YUfb]b[`CiHWcaYg

5ZhYfigi WWYggZ ``mWcad`Yh]b[ h\]giWcifgYžimci ig\ci`XiVYiUV`Yihc.

@YUfb]b[`CiHWcaY	95 GHJ[Y % 7ca dYhYbW]Yg
%"`@YUfb`h\Y`Z bWjcbg`UbX`fc`Yg`cZ_YmXf]``]b[ `Yei ]da YbhUbX	D9%"%žD9%"&žD9%") žD9&"%ž
UddUfUh g/	D9&"&žD9&"' žD9' "(
&"`6Y`[]jYb`Ub`]b!XYdh\`j]Yk`cZh\Y`d\mg]WU``dfcWYggYg`]bjc`jYX`]b	D9%"%žD9%"&žD9%"' žD9&"%ž
Xf]``]b[`c]``UbX`[Ug`kY``gžVch\`cb!g\cfY`UbX`cZig\cfY/	D9&"' žD9&"(žD9' "(
'"'@YUfb'hc'gY`YWhUddfcdf]UhY`Xf]``]b['f]['WcadcbYbhg'/ Yei]daYbhUg'hc'cdh]a]nY`Wcghg'Zcf'U'[]jYb'Xf]``]b['cdYfUh]cb fcbg\cfY'cf'cZg\cfYŁ"	D9%"' žD9&"%žD9&"&žD9&"' ž D9&"(žD9' "(

#### HYUWX]b[ GhfUhY[]Yg

%"KYY\_`m`YWfifYg`UfY`XYg][bYX`hc`dfcj]XY`ghiXYbhg`ZibXUaYbhU``ibXYfghUbX]b[`h\fci[\`U`gYf]Yg`cZ hcd]Wg`cb`Xf]``]b[`Yei]daYbhUbX`cdYfUh]cbg"

&"`H\Y`Z bXUa YbHJ``a UHYf]U``Wcj YfYX`]b`H\Y``YWi fYg`]g`gi ddcfHYX`VmdfcV`Ya !gc`j ]b[``Yl YfW]gYg`]b h hcf]U`g`UbX`WUgg`X]gW gg]cbg"

'""@YUfb]b["Xi f]b[""YWi fYg`]g'Z fh\Yf`gi ddcfhYX"Vm[ fci d'VUgYX"`UVcfUhcfmdfUWjWrg" (""C b`]bY""YUfb]b["gi ddcfh]g'U`gc'Uj U]`UV`Y'h\fci [ \`A ccX`Y"

@UVcfUhcfm[i]X`]bYg`k]``VY`dfcj]XYX`cb`A ccX`Y`df]cf`hc`@UV`gYgg]cbg"

#### 5ggYgga Ybh( A ]XhYfa 5ggYgga Ybh

Gi Va ]gg]cb`bcHYg.`Cb`]bY`A ccX`Y`gi Va ]gg]cb 8i Y`XUHY.`K YY\_`+

7 cj Yfg'a UhYf]U``Zfca 'hcd]W%'hc')

#### 5XX]h]cbU``XYHJ]`g

; i]XY`]bYg'Zcf'\Y`d]b[`f\Y`dfYdUfUf]cb'Zcf'f\Y'ei]n'k]``VY'fY`YUgYX'cb'A ccX`Y'df]cf'fc'f\Y'ei]n"

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 <u> </u>	

### FYgci fWg

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#### DfYgWf]VYX F Ygci fWfg

GiddcfhaUhYf]U`Zcf'h\]g'WeifgY`]bWiX]b[Zk\YbYjYf'UjU]`UV`YžWed]Yg`cZ`YWfifY`bchYgž`YWfifY`g`]XYgž fYWeaaYbXYX`fYUX]b[gžYhW'WUb`VY`ZcibX`cb`AccX`Y"

H\Y`YWMifY`bchYg#g`]XYg`aUmVY`j]YkYX`UbX`Xckb`cUXYX`Zfca`h\Y`LBGK!AccX`Y. \hnd.##accX`Y"hY`h'ibgk"YXi"Ui#

#### FYWca a YbXYX FYgci fW/g

: c``ck ]b[ g'UfY'h\Y'fYWca a YbXYX'Vcc\_g'Zcf'h\]g'Wci fgY.

# 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 YfmiUgg][ 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\YYhUhUV&YX"

# 7 cifgY Wcad`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"

# @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 ]hhYX``UhY'k ]h\ci hUb'Uddfcj YX'YI hYbg]cb'Vmh\Y'Wci fgY'WccfX]bUhcf'cf'XY`Y[ UhYX'Ui h\cf]m]g'gi V'YVh hc'U``UhY'dYbU`hmcZZj Y'dYfWfbhf) i EcZh\Y'a UI ]a i a 'a Uf\_'dcgg]V`Y'Zcf'h\UhUggYgga Ybh']hYa "'H\Y``UhY dYbU`hm`]g'Udd`]YX'dYf'WU`YbXUf'XUmf]bWi X]b['k YY\_YbXg'UbX'di V`]W\c`]XUmgE'h\UhIh\Y'UggYgga Ybh']g cj YfXi Y"'H\YfY']g'bc'dfc!fUhU'cZh\Y``UhY'dYbU`hmZcf'gi Va`]gg]cbg'a UXY'dUfhk Umh\fci [\`U`XUm''H\]g']g Zcf'U```UggYgga Ybhg'k \YfY'U'dYbU`hmUdd`]Yg"

K cf\_`gi Va ]hhYX`UZhYf`Z]jY`XUmg`f%&\$`\ci fgŁ`k]``bch'VY`UVWYdhYX`UbX`U`a Uf\_`cZnYfc`k]``VY`Uk UfXYX`Zcf h\Uh'UggYgga Ybh']hYa "

: cf`gca Y`UggYgga Ybh`]hYa gž`U``UhY`dYbU`hma Umbch'VY`Uddfcdf]UhY"`H\YgY`k]```VY`]bX]WUhYX`]b`h\Y`Wci fgY ci h`]bYž`UbX`gi W\`UggYgga Ybhg`k]```fYWY]j Y`U`a Uf\_`cZnYfc`]Zbch'Wca d`YhYX`Vmh\Y`gdYW]ZJYX`XUhY" 9I Ua d`Yg`]bWi XY.

- K YY\_`mcb`]bY`hYghg`cf``UVcfUhcfmk cf\_`k cfh\`U`ga U```dfcdcfh]cb`cZh\Y`gi VYWha Uf\_žcf
- C b`]bY'ei ]nnYg'k \YfY'Ubgk Yfg'UfY'fY`YUgYX'hc'gh XYbhg'cb'Wca d`Yh]cbž'cf'DfcZygg]cbU` UggYgga YbhHUg\_gž'k \YfY'h\Y']bhYbh]cb']g'hc'WfYUhY'Ub'Ui h\Ybh]WUggYgga YbhH\Uh\Ug'Ub'UVgc`i hY gi Va ]gg]cb'XUhYž'cf'DUgg# U]`'UggYgga YbhHUg\_g"

K Y'i bXYfgHUbX'H\Uh'Uh'h]a Yg'mci 'a Umbch'VY'UV'Y'hc'gi Va ]h'Ub'Ugg][ ba Ybh'cb'h]a Yž'UbX'H\Y'GW\cc``k ]`` UWWca a cXUHY'UbmZU]f'UbX'fYUgcbUV'Y'YI hYbg]cb"'K Y'k ci `X'fYWca a YbX'mci 'fYj ]Yk 'H\Y'I BGK 'GdYW]U` 7 cbg]XYfUh]cb'[ i ]XY`]bYg'-gYW]cb'VY'ck "

## GdYWJU``7cbg]XYfUh]cb

## 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>`\hdg.#k k k "gh XYbh'i bgk "YXi "Ui #g\_]``g</u>
- DgmWkc`c[miUbX`K Y``bYgg`!<u>kkk"WcibgY``]b["ibgk"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.#bh`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 dYWimci f`gi Va]HYX`Ugg][baYbhg`UfY`Hi`mimci f`ckb`kcf\_"`IBGK \Ug`j YfmWYUf`[i]XY`]bYg`cb`k\Uhd`U[]Uf]ga`]g`UbX`\ck`hc`Ujc]X`]H`D`U[]Uf]ga`]g`i g]b[`H\Y`kcfXg`cf ]XYUg`cZcH\Yfg`UbX`dfYgYbh]b[`H\Ya`Ug`mci f`ckb"`D`U[]Uf]ga`]g`U`HmdY`cZ]bH``YWi U``H\YZh``=hWUb`HU\_Y a UbmiZcfa gžZfca`XY`]VYfUHY`W\YUH]b[`Ha`]g`i g]b[`H\Y`kcfXg`cf

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# 5W\_bck `YX[ Ya YbhcZ7ci bhfm

KYUW\_bck`YX[Y`f\Y`6YXY[U``dYcd`Y`k\c`UfY`f\Y`ffUX]f]cbU``WighcX]Ubm % `JUbbd`Y]U\dIBGK.ffm

# 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  $d mg]WU^{g}UbX'hY'Yb[]bYYf]b['Z bXUa YbHU^{g}Udd^WUVY'hc'hY'Yb[]bYYf]b['X]gW[d^bYf]gW[d^bYf]b['X]gW[d^bYf]b['X]gW[d^bYf]gW[d^bYf]b['Y]gW[d^bYf]b['X]gW[d^bYf]b['Y]gW[d^bYf]b['Y]gW[d^bYf]b['Y]gW[d^bYf]b['Y]gW[d^bYf]g$ D9%"&'7cbW/dhU`ibXYfqHJbX]b['cZh\Y'aUh\YaUhWažbiaYf]WU`UbU`mq]qžqHJhjqhWqžUbX 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`qdYW[Z]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`]WUHcb'cZgmgH/a UHWyb[]bYYf]b['gmbH,Yg]g'UbX'XYg][b'dfcW/ggYg 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