ENGG1300

9b[]bYYf]b[`AYVXUb]Wg



ENGG1300 // Term 2, 2022 // published at 27-05-2022 $\ensuremath{\textcircled{\text{c}}}$ UNSW Sydney, 2022

(fi)

7 ci fgY⁻Cj Yfj]Yk

GHJZZ7cbHJWhi8YHJ]`g

7cbj Ybcfg

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KY]; Uc	<u>k "[Uc4 i bgk "YXi "Ui</u>	%\$\$da !&.\$\$da cb`Hi YgXUmg	F cca `*\$, ž 6i]`X]b[`<&\$	-',)`(%&'

GWXcc``7cbHJWhi=bZcfaUhjcb

<u>9b[]bYYf]b[_`Ghi XYbhGi ddcfhGYfj]</u>Wyg'-'H\Y`Bi WYi g`!`Ybfc`a Ybhž'dfc[fYgg]cb`W\YW_gžWUg\`fYei Yghgž Wci fgY`]ggi Yg`cf`dfc[fUa !fY`UhYX'ei Yf]Yg`

<u>9b[]bYYf]b[`+bXi ghf]U``HfU]b]b[</u>`-`+bXi ghf]U``HfU]b]b[`ei Ygh]cbg`

<u>I BGK 'Gh Xm5VfcUX</u>'-gh XmUVfcUX'gh XYbhYbei]f]Yg'fZcf']bVci bX'gh XYbhgŁ'

<u>IBGK '91 W.Ub[Y</u>'-'ghi XYbhYI W.Ub[Y'Ybei]f]Yg'fZcf']bVci bX'ghi XYbhgŁ'

LBGK :: i h fY'Gh XYbhg'-'dchYbh]U``gh XYbhYbei]f]Yg'Y"["'UXa]gg]cbgž'ZYYgž'dfc[fUa gž'WfYX]hhfUbgZYf'

D\cbY[.]

fŽ*%*&Ł-',)*,)\$\$`-BiWYig`GhiXYbh<iV`

fŽ*%`&Ł'-',)`+**%`**-**`9b[]bYYf]b[`⊕Xi gHf]U``HfU]b]b[`

fŽ*%`&Ł'-',)`'%+-`<mark>-</mark>`IBGK `GhiXm5VfcUX`UbX`IBGK `9IWXUb[Y`fZcf`]bVcibX`ghiXYbhgŁ`

7 ci fgY`8YHJ]`g I b]hg`cZ`7fYX]h`*` Gi a a UfmcZ'h\Y`7 ci fgY

5ggYgga Ybh

5ggYgga Ybh'HJg_	K Y][\h	8iY'8UHY	

mci 'UfY'`UhY'mci 'Xc'bchfYWY]jY'UXX]h]cbU``h]a Y"`H\YfY'k]``VY'bc'gi dd`Ya YbhUfmei]n"'=Z'mci 'a]gg'cf WUbbch'UhYbX']hžmci 'WUb'Udd`mZcf'gdYW]U`'Wcbg]XYfUh]cbž]Z'gi WWYggZi `ž']hg'k Y][\h]b['WUb'VY X]ghf]Vi hYX'hc'h\Y'Z]bU`'YI Ua "'

5ggYgga Ybh'Wf]hYf]U

Gc`jY'dfcV`Yag'UbX'XYacbglfUhY'[ccX'Yb[]bYYf]b['dfUWf]WY']b'Ub'YIUa'Ybj]fcbaYbh

5ggYgga Ybh' . @UV 5gg][ba Ybhflı ŁUbX 7\U`Yb[]b[Ei Ygh]cbg 5gg][ba Ybh f%sı Ł

GłUfh'XUhY. K YY_'(5ggYgga Ybh``Yb[h\. 'UŁ'@UV'Ugg][ba Ybh'' 'k YY_g/VŁ'7\U``Yb[]b['E i Ygh]cbg'Ugg][ba Ybh') 'k YY_g 8i Y'XUhY. '@UV!K YY_'+/7\U``Yb[]b[!K YY_'-8YUX`]bY'Zcf'UVgc`i hY'ZU]`. '') 'XUmg'UZh'f'h\Y'XYUX`]bY A Uf_g'fYh fbYX. ''K]h\]b'+'XUmg

H\Y``UV`Ugg][ba YbhUbX`W\U``Yb[]b[`ei Ygh]cbg`Ugg][ba YbhUfY`XYg][bYX`hc``Yhmci `Xc`j]fh U``fYU`]m``UV YI dYf]a Ybhg`UbX`Xc`dfUWjWY`Vmgc`j]b[`U`gYhcZW\U``Yb[]b[`dfcV`Ya gžfYgdYWjj Y`m'`@UhY`k cf_`k]```VY dYbU`]gYX`Uh'h\Y`fUhY`cZ`)ı `dYf`XUmUZhYf`h\Y`gi Va]gg]cb`XYUX`]bY`UbX`WUddYX`Uh'Zjj Y`XUmg`f%&\$ \ci fgŁ"

5ggYgga Ybh'\#]hYf]U

UŁ'@UV'Ugg][ba Ybh']a d'Ya Ybhj]fh U`'fYU']mi`UV'YI dYf]a Ybhg

<i fX`Y'fYei]fYa Ybh

Ghi XYbhgʻbYYXʻhcʻUWX]Yj YʻUhʻYUghʻ(\$i -]bʻh\YʻZ]bUʻYI Ua `]bʻcfXYfʻhcʻdUggʻh\YʻWci fgY"

5HYbXUbW/FYei]fYaYbhg

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

7 ci fgY GWX YXi `Y

B MSeW`afWfZWXa ^wai [Y eUZWWg WaXFab[Ue UahWdWW [WSUZ i WW] [e S Yg[VWa` k S` V egTWUf fa UZS` YWTSeVW a` f[_ WUa` efdS[`fež B MSeWSffW V fZW MUfgdMe WSUZ i WW] fa W egdWkag SdWgb fa VSfW i [fZ fZWUa` fW f S` V]`ai i Z[UZ _ SfWd[S^fa dMh[eWbd[ad fa fZWgbUa_ [`Y U'Seež

J]Yk WUgg ha YHUYY

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Hmd Y	7 c bhYbh
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K_YY_`+.`%%`>i`m!`%) >i`m	Hcd]W	A,; Yca Yhf]WGYWf]cb'DfcdYfh]Yg'cZD`UbY :][ifYg/7Ybhfc]X/GYWcbX'A ca YbhicZ5fYU/ DUfU``Y``5I]g'H\YcfYa/ A:=bhfcXiWf]cb'hc'8mbUa]Wg
	5ggYgga Ybh	@UV 5gg][ba YbhXi Y cb : f]XUmUh, da
		KYY_+EiJn.A,
K_YY_`, .`%_`>i_`mi!`&& >i_`m	Hcd]W	A∵?]bYaUh]WgʻcZdUfh]WYg∕Ach]cbʻ]bʻCbY 8]aYbg]cb/FYWf]`]bYUfʻAch]cb
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K YY_'`&)`>i`m!`&- >i`m		

FYgci fWfg

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

6Yk UfY**5b*Ugg][ba Ybhih Uhi]bWi XYg*d*U[]Uf]gYX*a UhYf]U**k]``*fYWY]jY*U*\$i **U]`ž*UbX*ghi XYbhg*k \c d*U[]Uf]gY*a UmZU]`*h\Y*Wci fgY**Ghi XYbhg*k \c*d*U[]Uf]gY*UfY*U*gc**]UV*Y*hc*X]gW]d*]bUfm*UWf]cbž]bWi X]b[YI Wi g]cb*Zfca *Ybfc*a Ybh

D`U[]Uf]ga `]g`h\Y`i gY`cZUbch\Yf`dYfgcb'g`k cf_`cf`]XYUg`Ug`]Zh\Ymk YfY`mci f`ck b"`K \Yb`]h`]g`bYWfggUfmcf XYg]fUV`Y`hc`i gY`ch\Yf`dYcd`Y'g`a UhYf]U``mci `g\ci `X`UXYei UhY`mUV_bck `YX[Y`k \cgY`k cfXg`cf`]XYUg`h\Ym UfY`UbX`k \YfY`mci `Zci bX`h\Ya `f[]j]b[`h\Y`Wca d`YhY`fYZYfYbWf`XYhU]`gž`]bWi X]b[`dU[Y`bi a VYffgL''`H\Y @YUfb]b[`7YbhfY`dfcj]XYg`Z fh\Yf`]bZcfa Uh]cb`cb`k \UhWcbgh]hi hYg`D`U[]Uf]ga `Uh

<u>\hdg.##ghi XYbh'i bgk "YXi "Ui #d`U[]Uf]ga</u>

5WUXYa]W=bZcfaUh]cb

:]bU`'9I Ua]bUh]cbg.

:]bU`YI Ua g`]b`H&`&\$&&`k]``VY`\Y`X`cb`]bY`VYfk YYb`%&f\`!`&) f\`5i [i gh'&\$&&`]bWi g]j Yž'UbX gi dd`Ya YbfUfm`YI Ua g`VYfk YYb`) f\`!`-f\`GYdfYa VYf`&\$&&`]bWi g]j Y"`Nci `UfY`fYei]fYX`fc`VY`Uj U]`UV`Y`cb f\YgY`XUfYg"`D`YUgY`Xc`bchfc`a U_Y`UbmidYfgcbU``cf`ffUj Y``UffUb[Ya Ybfg`Xi f]b[`f\]g`dYf]cX"`

57589A = 758J = 79

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5ddYbX]I. '9b[]bYYfg'5ighfU`]U'f195ŁDfcZYgg]cbU`'9b[]bYYf'7cadYhYbWm GHJbXUfX

Dfc[fUa +bhybXYX @YUfb]b[Cihwca Yq ? bck `YX[Y 'UbX'q_]``'VUqY D9%"%7cadfY\Ybq]iYžh\YcfmVUqYXibXYfqHUbX]b[cZh\YibXYfd]bb]b[bUhifU`UbX d/mg]WU`:gW]YbWYg`UbX`h\Y`Yb[]bYYf]b[`Z bXUa YbHU`g`Udd`]WUV`Y`hc`h\Y`Yb[]bYYf]b[`X]gW]d`]bY D9%"& 7 cbW/dhiU`i bXYfqHUbX]b[cZh\Y`a Uh\Ya Uh\Wažbi a Yf]WU`UbU`mg]qžqHUh|qh\WažUbX Weadi hYf'UbX']bZcfaUh]cb'gW]YbWYg'k\]WX'i bXYfd]b'h\Y'Yb[]bYYf]b['X]gW[d`]bY D9%" + + XYdh i bXYfqHbX]b[cZqdYWU`]qhVcX]YqcZ bck YX[Yk]h bhY'Yb[]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]qW[d`]bY D9%"* I bXYfqHJbX]b[cZh\Y'qWcdYždf]bW]dYgžbcfa gžUWVci bHJV]]]h]Yg'UbX'Vci bXg'cZ qi qHU]bUV`Y`Yb[]bYYf]b[`dfUWf\WY`]b`H\Y`qdYW[Z]WX]qW[d`]bY 9b[]bYYf]b['Udd`]WUhcb'UV]`]hm D9&"%5dd`]WUhjcb`cZYghUV`]g\YX'Yb[]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`]WUHcb'cZgmghYa UHWUddfcUWXYg'hc'h\Y'WcbXi WiUbX'a UbU[Ya YbhcZYb[]bYYf]b[dfc Y₩q DfcZYgg]cbU`UbX dYfgcbU`Uhf]Vi hYg D9' "%'9h\]WU``WcbXi WiUbX'dfcZygg]cbU``UVWci bHUV]`]hm D9' "&'9ZYW) Y'cfU`'UbX'k f)HYb'Wca a i b)WU) cb']b'dfcZygq]cbU`'UbX'`UmXca U]bg D9' "' 7 fYUhi Yžibbci Uhi YUbX dfc!UWi YXYa YUbci f D9' "('DfcZygg]cbU``i gY'UbX'a UbU[Ya YbhcZ]bZcfa Uhcb D9' ") CfXYfma UbU[Ya YbhcZgYZzUbX dfcZygq]cbU`WcbXi Wh D9' "* 9ZYWAJ Y HYUa 'a Ya VYfg\]d UbX HYUa 'YUXYfg\]d