

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

#### GHJZZ7cbHJWh8YHJ]`g

#### 7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]hm	@cWUhjcb	D\cbY
DfcZYggcf"6f][]HU C`iVUg	V"c`i VUg4 i bgk "YXi "Ui	6mUddc]bha Ybh	KYVghYf*&&)	

#### GWkcc`7cbhJWhi ≠bZcfa Uh]cb

GVXcc``cZhY`5fhg`UbX`AYX]U

Fcca " %&ž@Yj Y`" žFcVYffiK YVgfYf'6i ]`X]b[ 'f) %( Ł

D\cbY.'f\$&E'-',)'(,)\*

9a U]`. 'gUa 4 i bgk "YXi "Ui

K YVg]hY. k k k "Ufhg"i bgk "YXi "Ui #gUa

H\Y'GW\cc``cZh\Y'5ffg`UbX'A YX]U'k ci `X``]\_Y'bc'F YgdYWM\``m5W\_bck `YX[Y'h\Y'HfUX]hjcbU``7 i ghcX]Ubgž h\Y'6YXY[U``fP Ybg]b[ hcb'WJa di g\z'; UX][U``fP ]hmUbX'5fh\/ '8Yg][b'7 Ua di g\Yg\z'UbX'h\Y'B[i bbUk U` d\Ycd'Y'fb i ghfU`]Ub'8YZ\YbW': cf\W'5\WJXYa m]b'7 Ub\YffU\z'cZh\Y``UbXg'k \YfY'YUW\'WJa di g'cZl BGK ']g `c\WJh\X''

## 7ci fgY 8YHJ] g

7 fYX]hDc]bhg\*\*

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

H\]g`Wci fgY`]bffcXi W'g`mci `hc`a U'cf`]ggi Yg`UbX`k cf\_g`]b`5i glfU`]Ub``]hYfUh fYž'k ]h\`U`dUff]W``Uf`ZcW g`cb a UhYf]U``Zfca `h\Y`dUghtk c`W'bh f]Yg"'=k ]```WcbhYl h U`]gY`]a dcftUbhk cf\_g`]b`hYfa g`cZU`fUb[Y`cZ`cWU``UbX [`cVU```]hYfUfmUbX`W``h fU``Zcfa Uh]cbgž'h\i g`dfcj ]X]b[`U`a Ud`cZh\Y`Wca d`Yl `UbX`W\Ub[]b[`bUh fY`cZ bUh]cbU``W``h fY"'Mci `k ]``gh Xma UhYf]U``Vmk f]hYfg`Zfca `X]j YfgY`VUW\_[ fci bXgž]bWi X]b[`=bX][ Ybci g k f]hYfg"'Mci `k ]``U`gc`Yb[ U[ Y`k ]h\`h\Y``Uf[ Yfdi V`]WW``h fY`cZ5i glfU`]Ub`@|hYfUh fY`VmWcbg]XYf]b[`h\Y d`UWY`cZ`]hYfUh fY`]b`WcbhYa dcfUfm`]Z'"-Zmci `UfY`Wca d`Yh]b[``U`dfc[ fUa `]b`9Xi WUh]cb`Gh X]Ygžmci `k ]``VY cZYfYX`h\Y`cdh]cb`cZdi fgi ]b[`mci f`gh XmcZ5i glfU`]Ub`@|hYfUh fY`h\fci [\`U`dYXU[ c[]WU`fi Vf]W

### 7ci fgY @YUfb]b[ 'Ci hWca Yg

%" ⇒XYbhZm\_Ym]qqi YqʻUbXʻa ca Ybhqʻ]bʻh\Yʻ5i qhfU`]Ubʻ`]hYfUfmihfUX]h|cb"

- &" 9b[U[Y'Wf]h]WU``mik ]h\`\_Ymi]ggi Yg'UbX'a ca Ybhg']b'h\Y'5i ghfU`]Ub'``]hYfUfmhfUX]h]cb'h\fci [\'h\Y UbU`mg]g'cZgdYW[Z]WhYI hg'UbX']b'U'fUb[Y'cZcfU``UbX'k f]hhYb'a cXYg"
- ' "8 Ya cbghfuhY 'Yb\Ub\WX X ZJa] `]Uf]hmik]h\`a U'cf``]hYfUfmihYl hg`Vmi5i ghfu`]Ub`Ui h\cfg" ( "8 Ya cbghfuhY 'Ub'i bXYfqhUbX]b[ 'cZh\Y 'dfchc\Wc`q`cZU\WXYa]\W\_bck `YX[ Y \Wcbghfi \Whcb"

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

H\Y`WcifgY`]g`HUi[\hih\fci[\``YWhifYg`UbX`hihcf]U`g"

@YWn fYg'dfcj ]XY'WcbhYl hi U``]bZcfa Uh]cbž'ci h]bYg'cZWf]h]WU``fYgdcbgYg'hc'h\Y'hYl hg'UbX'gca Y'WcgYX]gWlgg]cb"'Hi hcf]U`g'fYei ]fY'ghi XYbhg'hc'Yb[ U[ Y'UWn]j Y`mk ]h\'h\Y'`YWn fY'UbX'fYUX]b[ 'a UhYf]U``UbXXYj Y`cd'h\Y]f'ck b'Wf|hWU``fYgdcbgYg"

ARTS2031 Term 2, 2021 published at 28-04-2021 // © University of New South Wales, 2021

## 5ggYgga Ybh

### 5ggYgga Ybh'HUg\_g

5ggYgga Ybh'HJg_	K Y][ \h	8i Y'8UHY	Gh XYbh@YUfb]b[ Ci hWca Yg 5ggYggYX
9ggUmi	) \$1	\$&#\$+#&\$&%`\$, .\$\$`DA</td><td>%ž'&ž'' ž'(</td></tr><tr><td>HU_Y!\ca Y'Yl Ua '</td><td>) \$1</td><td>\$-#\$,#&\$&%`\$,.\$\$`DA</td><td>%ž'&ž' ž'(</td></tr></tbody></table>	

#### 5ggYgga Ybh8YHJ]`g

5ggYgga Ybh% 9ggUm

GhUfhXUhY. Bch5dd`]WUV`Y

@Yb[h\.'%) \$\$ k cfXg

8YHJ]`g.

±X]j ]Xi U`

%) \$\$!k cfXg

F YgdcbgY hc 'U'dfcdcg]h]cb 'gYhVm'Wcbj Ybcf

) \$!dYfWWbh

: YYXVUW\_'j ]U'@A G

 $\label{thm:limit} \begin{tabular}{ll} Hi fb]h]b"gYhh]b" . "H\]g"Ugg][ba Ybh]g"gi Va ]hhYX"h\fci [\ 'Hi fb]h]b"UbX"gh XYbhg"Xc"bchgYY"Hi fb]h]b g]a ]"Uf]hmfYdcfhg" \\ \end{tabular}$ 

5ggYgga Ybh& HU\_Y!\ca Y Yl Ua

GhUfhiXUhY. \*\$\*#\$, #&\$&%\*\$(.\$\$\*DA

**@Yb[h**\.'Uddfcl''%) \$\$"k cfXg

8 YW] g.

⊕X]j ]Xi U`

HU\_Y!\ca Y`Yl Ua

%) \$\$! &\$\$\$ k cfXg

) \$!dYfW\bh

#### : YYXVUW<u>'</u>j]U'@A G

 $\label{thm:condition} \mbox{Hi fb]h]b"gYh]b[."H\]g"Ugg][ba Ybh]g"gi Va ]hhYX"h\fci [\Thi fb]h]b"UbX"ghi XYbhg"Xc"bchgYY"Hi fb]h]b g]a ]"Uf]hmfYdcfhg"$ 

# 5 hm/b XUb VW F Yei ]fYa Ybhg

 $\hbox{Ghi XYbhg'UfY'ghfcb[`mYbWci fU[YX'hc'UhhYbX'U```WUggYg'UbX'fYj]Yk ``YWhi fY'fYWcfX]b[g''] } \\$ 

# 7ci fgY GWX YXi `Y

## J]Yk 'WUgg'hja YhUV'Y

## H]a YtUV`Y

8 UhY	HmdY	7 cbhYbh	
K YY_^% ^' %^A Um'! ^( ^>i bY	@YWh fY	K Y`Wca Yž±blfcXi Whjcb hc 5i glfU`]Ub @jhYfUhi fY	
	Hi hcf]U`	<pre>#blfcXi Whjcbž5i glfU`]Ub`@jhYfUhi fYž7c`cb]U`Ghcf]Yg"</pre>	
		D`YUgY`fYUX`Uh`YUghcbY`cZh\Y`ghcf]Yg`gW\YXi `YX Zcf`K YY_g`&`UbX`' "	
		Hi hcf]U``dfYdUfUh]cb`hcd]Wg`k]```VY`dcghYX`hc`h\Y WcifgY`accX`Y`g]hY"	
K YY_`&.`+`>i bY`!`\\ >i bY	@YWi fY	H\Y`dYfj YfgYž'h\Y`; ch\]\W*UbX'h\Y YI dYf]a YbrU`. '7 c`cb]U``Grcf]Yg`Vm'9fbYgh: Uj Yb\W* 5XU`7 Ua Vf]X[ Yž'HUga U`fZ]bX`\\cd]\Yg`cZU```cZh\YgY cb`\\cdot\tagY`a ccX`Y`g]h\YL"	
	Hi hcf]U`	D`YUgY`fYUX`H\YgY`VYZcfY`H\Y``YWhifY" A UHYf]U``Wcj YfYX`]b`K YY_`&``YWhifY"	
		Hi hcf]U`dfYdUfUh]cb'hcd]Wg'k]``VY'dcghYX'hc'h\Y Wci fgY'a ccX`Y'g]hY"	
K YY_'' .'%) '>i bY'!'% >i bY	@YWhi fY	=fcbmiUbXih\Y; ch\]W#Amh\]W' <ybfmi@ukgcbiubx< td=""></ybfmi@ukgcbiubx<>	

DcYa gʻVmi>c\bʻG\UkʻBY]`gc >i X]h\ʻK f][\hž; kYbʻ<Ufk

# Fygci fWyg

DfYgWf]VYX F Ygci fWYg

 $HYI hg gi dd`]YX cb A ccX`Y cf h fci [ \ @Y[ Ubhc.$ 

7 c`cb]U``G\cfhghcf]Yg`Vm5XU`7 Ua Vf]X[Yž`9fbYgh: Uj YbWUbX`HUga U

Ghcf]Yg Vm < Ybfm@Uk gcb UbX 6UfVUfU 6Umbhcb

5`ZHUmcfžGY`YWYX'Ghcf]Yg

GY`YWnjcb'cZ5i ghfU`]Ub'DcYhfm

5bh][cbY'?YZU'Už'"H\Y':]fghi>cifbYm"fZfca FZW8[cef<agd Wk, Fi a EZadf@ahWek

## Gi Va ]gg]cb cZ5ggYgga YbhHUg\_g

### Hi fb]h]b Gi Va ]gg]cb

Image: Ybwei bhyfu'dfcv'ya k \yb'uhhya dhjb[ 'hc'gi va ]hmci f'Ugg][ ba Ybhh\fci [ \ 'Hi fb]h]bž'd'YUgY

Hy'Yd\cby'9| hy'fbu''Gi ddcfhcb'-', ) "''' %cf'Ya U] hya 'cb'Yl hy'fbu'hy'ngi ddcfh4 i bgk "YXi "Ui "''Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY\_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY\_YbXg'fl \*) 'XUmg'U'mYUft"'=Z'mci
UfY'i bUV'Y'hc'gi va ]hmci f'Ugg][ ba YbhXi Y'hc'U'ZJi 'hk ]h\ 'Hi fb]h]b'mci 'a Um'Udd'mZcf'Ub'Yl hy'bg]cbž'Vi hmci
a i ghfYhJ]b'mci f'h]W\_Yhbi a VYf'Zfca '9| hy'fbu''Gi ddcfhfU'cb[ 'k ]h\ 'Ubmch\Yf'fy'Yj UbhXcW a Ybhgthc
]bWi XY'Ug'Yj ]XYbW'hc'gi ddcfhmci f'Yl hy'bg]cb'Udd']WUh]cb"'=Zmci 'Ya U]''9| hy'fbu''Gi ddcfhmci 'k ]'`
Ui hca Uh]WJ'`mfYW']j Y'U'h]W\_Yhbi a VYfZ'Vi h]Zmci 'hy'Yd\cby'mci 'k ]``bYYX'hc'gdYW]Z]WJ'`mUg\_'Zcf'cby''
Hi fb]h]b'U'gc'dfcj ]XYg'i dXUhy'g'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hyf''

; YbYfU``mž'UggYgga YbhiHug\_g'a i ghVY'gi Va ]hhYX'Y`YVWfcb]\W)``mij ]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ ba Ybh'' =b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk ]```VY'gHJhYX'cb'mci f'\\circ i fgY'g'A ccX`Y'g]hY'k ]h\U`hYfbUh]j Y'gi Va ]gg]cb'XYHJ]`g''

cfi]bZcfa Uhjcbicbi\ckihcigi Va ]hUgg][ ba Ybhgicbi]bYij ]UiA ccXiY.i\hdg.#gh XYbhi bgk "YXi "Ui #\ck! gi Va ]hUgg][ ba Ybha ccXiY

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

D`U[]Uf]ga i]gii g]b[ih\Yik cfXgicfi]XYUgicZch\YfgiUbXidfYgYbh]b[ih\Ya iUgimci fick b"i=hWJbihU\_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiWXYUh]b[ihciUWW]XYbhU`mWcdm]b[iZfca iUigci fWYik]h\ci hiUW\_bck iYX[Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga ]bhc'h\Y'Zc``ck]b['WUhY[cf]Yg.

• i bXYfgHJbX'mci f'f][\hg'UbX'fYgdcbg]V]`]h]Yg'Ug'U'gh XYbh'Uhil BGK

# 5WUXYa]W±bZcfaUhjcb

: cf'YggYbhJU`ghi XYbh]bZcfa UhJcb'fY`UhJb['lc.