	EXAMINATION QUESTIONS/SOLUTIONS 2007-08	Course
	Extramitation Questions, successful as	
	E2-11 - IJEZ MATHS-	ISE2.
	SILUTIONS ZOUS	
Question		Marks &
7		seen/unseen
Parts (i)	$\hat{u}_{a}(\omega) = \int_{a}^{a} u_{a}(t) e^{-i\omega t} dt = \int_{a}^{a} e^{-i\omega t} dt$	· ·
	$= -\frac{1}{i\omega} \left[ e^{-i\omega a} - e^{i\omega a} \right] = \frac{2}{\omega} \sin(\omega a)$	4
(ii)	Since dh = g we have $\hat{g} = i\omega \hat{h}$	
	& also $g(t) = f(t+a) - f(t-a)$ $\Rightarrow \hat{g}(\omega) = \int_{-\infty}^{\infty} f(t+a) e^{-i\omega t} dt - \int_{-\infty}^{\infty} f(t-a) e^{-i\omega t} dt$	
	$= \int_{-\infty}^{\infty} f(s) e^{-i\omega(s-a)} ds - \int_{-\infty}^{\infty} f(s) e^{-i\omega(s+a)} ds$	
	$= e^{i\omega a} \hat{f}(\omega) - e^{-i\omega a} \hat{f}(\omega) \int_{\text{just quote}}^{\text{or ean}} \int_{\text{shift}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{shift}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{or ean}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{rule}}^{\text{or ean}} \int_{\text{or ean}}^{\text{or ean}} \int_{$	mostly
	Thus we have $\hat{h} = \frac{2}{\omega} \sin(\omega a) \hat{f}$ as the reg'd relation.	6 but
(iii)	Using convolution: $h(t) = (FT)^{-1} \left\{ \frac{2}{\omega} \sin(wa) \right\}$ $= \hat{g}, 3ay$	phrased different
	$= \int_{-\infty}^{\infty} f(t-s) g(s) ds$	
	but, from part (i) we see that $g(t) = u_a(t)$ .	
	$h(t) = \int_{-\infty}^{\infty} f(t-s) u_{\alpha}(s) ds$	
	$= \int_{-a}^{a} f(t-s) ds$ $= \int_{-a}^{a} f(t+s) ds$ $= \int_{-a}^{a} f(t+s) ds$	6
(iv)	By differentiating this last expression we have $dh/dt = \int_{-a}^{a} f'(t-s) ds = \int_{-a}^{a} f(t+s) ds$ $= \int_{-a}^{t+a} f'(t-s) ds = \int_{-a}^{a} f(t+s) ds$	(Total 20)
	= f(t+a) - f(t-a) / 3, 80  OK /	1
	Setter's initials  Checker's initials  Afw	Page number
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EXAM	INATION QUESTIONS/SOLUTIONS 2007-08	Course
		ISE 2.
Question		Marks &
2		seen/unseen
Parts (i) Solf(u	$ \hat{f}^{*}(\omega) ^{2} d\omega = \int_{-\infty}^{\infty} \hat{f}(\omega) \hat{f}^{*}(\omega) d\omega$	
	$=\int_{-\infty}^{\infty}\left(\int_{-\infty}^{\infty}f(t)e^{i\omega t}dt\right)\left(\int_{-\infty}^{\infty}f^{*}(\omega)e^{i\omega u}d\omega\right)d\omega$	
Changing order of integrat	$f_{\omega} = \int_{t=-\infty}^{\infty} f(t) \int_{u=-\infty}^{\infty} f^*(\omega) \left( \int_{\omega=-\infty}^{\infty} e^{-i\omega(t-\omega)} d\omega \right) du dt$	2 10
	277 S(t-u) (given)	2
	$= 2\pi \int_{t=-\infty}^{\infty} f(t) f^*(t) dt$	2
	$= 2\pi \int_{-\infty}^{\infty}  f(t) ^2 dt \qquad \text{Hence}$	2
Alter	the convolution theorem	(i) is seen
(ii) We an	e given $f(t) = \begin{cases} 0 & t < 0 \\ e^{-t} & t \geqslant 0 \end{cases}$	(ii) is unseen
LHS of	Parseval formula is $\int_{-\infty}^{\infty}  f(t) ^2 dt = \int_{-\infty}^{\infty} e^{-2t} dt$	2 ]
	$= \left[ -\frac{1}{2} e^{-2t} \right]_0^{\infty} = \frac{1}{2}$	1
f(ω):	lunde RHS, first new $\hat{f}(\omega)$ . = $\int_{0}^{\infty} e^{-t} e^{-i\omega t} dt = \int_{0}^{\infty} e^{-(1+i\omega)t} dt$	10
	$= \left[ -\frac{1}{1+i\omega} e^{-(1+i\omega)t} \right]_{0}^{\infty}$	2
	$\hat{f} ^2 = \hat{f}\hat{f}^* = \frac{1}{1+i\omega} = \frac{1/(1+i\omega)}{1-i\omega}$	
Thus, RH.	- 1/(11.2)	2 4,
$\frac{1}{2\pi}\int$	Sof Parseval is $\frac{1}{2\pi} \left[ \tan^{-1}(\omega) \right]^{\infty} = \frac{1}{2\pi} \left( \frac{\pi}{2} \left( -\frac{\pi}{2} \right) \right)$ $\frac{1}{2\pi} \left[ \tan^{-1}(\omega) \right]^{\infty} = \frac{1}{2\pi} \left( \frac{\pi}{2} \left( -\frac{\pi}{2} \right) \right)$ $\frac{1}{2\pi} \left[ \tan^{-1}(\omega) \right]^{\infty} = \frac{1}{2\pi} \left[ \frac{\pi}{2} \left( -\frac{\pi}{2} \right) \right]$ This is a sum of the state of the s	2 / ( lota
Setter's in	itials Checker's initials  AGW	Page number

Question $Satution$		EXAMINATION QUESTIONS/SOLUTIONS 2007-08	Course
Question Solution $S$ of $S$		<b>2</b> , a	_
Solution To Q3  Parts  (i) $y = x^2$ $y = x^{1/2}$ C is formed from the union of $C_1 \otimes C_2$ . $C_2 \otimes C_3 \otimes C_4$ $C_3 \otimes C_4 \otimes C_4$ $C_4 \otimes C_5 \otimes C_5 \otimes C_4$ $C_5 \otimes C_5 \otimes C_6 \otimes C_6$ $C_6 \otimes C_6 \otimes C_6 \otimes C_6$ $C_7 \otimes C_7 \otimes C_7$			IJE &
Solution To Q3  Parts  (i) $y = x^2$ $y = x^{1/2}$ C is formed from the union of $C_1 \otimes C_2$ . $C_2 \otimes C_3 \otimes C_4$ $C_3 \otimes C_4 \otimes C_4$ $C_4 \otimes C_5 \otimes C_5 \otimes C_4$ $C_5 \otimes C_5 \otimes C_6 \otimes C_6$ $C_6 \otimes C_6 \otimes C_6 \otimes C_6$ $C_7 \otimes C_7 \otimes C_7$	0		
Parts (i)  Parts (i) $y = x^2$ $y = x^{1/2}$ C is formed from the union of $C_1 \otimes C_2$ . $C_2 \otimes C_3 \otimes C_4 \otimes C_4 \otimes C_5 \otimes C_5 \otimes C_5 \otimes C_5 \otimes C_6 \otimes C_$	1466	TION	Marks &
(i) $ \begin{array}{c} y = x^{1/2} \\ c_{2} & c_{1} \\ c_{2} & c_{2} \\ c_{3} & c_{4} \\ c_{5} & c_{5} \\ c_{5$	To	Q3	seen/unseen
C is formed from the union of $C_1$ as $C_2$ .  C is formed from the union of $C_1$ as $C_2$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_1$ as $C_2$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_1$ as $C_2$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from the union of $C_2$ as $C_3$ .  C is formed from (n,0) to $C_1$ .  C gase from $(0,0)$ to $(0,0)$ to $C_3$ .  S in use form $(0,0)$ to $C_3$ .  C gase from $(0,0)$ to $C_3$ .  C gase from $(0,0)$ to $C_3$ .  C gase from $(0,0)$ to $C_3$ .  S in use have $C_3$ and $C_3$ as $C_3$ .  C is formed from $C_3$ .  C is formed from $C_3$ .  S in use $C_3$ and $C_3$ and $C_3$ and $C_3$ .  C is formed from $C_3$ .  S is formed from $C_3$ .  C is formed from $C_3$ .	( )	$\int_{-1}^{1} \int_{-1}^{1} \frac{1}{x^2} dx = \frac{1}{x^2}$	
(ii) He union of $C_1 \otimes C_2$ $C_1$ goes from $(0,0)$ to $(1,1)$ to $(0,0)$ (ii) For $n=1$ we have $y=x^2$ & hence $dy=2x dx$ Thus, writing $T_1$ in terms of $y$ we have $T_1 = \int_0^1 \frac{2x^8}{2x^2} dx - \frac{x^2}{2x^2} dx = 0$ Hor $n=2$ we have $y^2=x \Rightarrow 2y dy = dx$ Writing $T_2$ in terms of $y$ we have $T_2 = \int_1^0 (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[\frac{y^2}{2}\right]_1^0 = -\frac{3}{4}$ (iii) We have $P = \frac{y^4}{x^2}$ , $Q = -\frac{1}{2}\frac{y^3}{y^2}$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2}\frac{y^3}{x^2} - \frac{4y^3}{3} = -\frac{7}{2}\frac{y^3}{x^2}$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2}\frac{y^3}{x^2} - \frac{4y^3}{3} = -\frac{7}{2}\frac{y^3}{x^2}$ Pdx + $Q$ dy = $\int_1^0 -\frac{7}{2}\frac{y^3}{x^2} dx dy$ $= \int_{x=0}^0 \int_{y=x^2}^{y=x^2} \frac{y^3}{x^2} dy dx$ $= \int_{x=0}^0 \int_{y=x^2}^{y=x^2} \frac{y^3}{x^2} dy dx$ $= \int_{x=0}^0 \int_{y=x^2}^1 \frac{y^3}{x^2} dx dx$ $= -\frac{7}{8}\int_{x=0}^1 (1-x^6) dx = -\frac{3}{4}$ (iv) Since $\int_C = \int_{C_1} \int_{C_2}^1 \int_{y}^1 dy dx$ Setter's initials  Checker's initials  Page number		C is formed from	
(ii) For $n=1$ we have $y=x^2$ & here $dy=2xdx$ .  Thus, writing $T_1$ in terms of $y$ we have $T_1 = \int_0^1 \frac{2x^8}{2x^2} dx - x^7 2x dx = 0$ $2x^2 = \frac{2x^2}{2x^2}$ For $n=2$ we have $y^2=x \Rightarrow 2ydy=dx$ $2x^2 = \frac{2x^2}{2x^2}$ $T_2 = \int_0^0 \frac{y^4}{y^2} \cdot 2y dy - \frac{1}{2} \frac{y^3}{y^2} dy$ $= \int_0^0 (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[\frac{y^2}{y^2}\right]^0 = -\frac{3}{4}$ (iii) We have $f = y^4/x^2$ , $Q = -\frac{1}{2}y^3/x$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial F}{\partial y} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} = -\frac{7}{2} \frac{y^3}{x^2}$ $\frac{\partial Q}{\partial x} - \frac{\partial F}{\partial y} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} = -\frac{7}{2} \frac{y^3}{x^2}$ $\frac{\partial Q}{\partial x} - \frac{\partial F}{\partial y} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} = -\frac{7}{2} \frac{y^3}{x^2}$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} = -\frac{7}{2} \frac{y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} = -\frac{7}{2} \frac{y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = \frac{1}{2} \frac{y^3 - 4y^3}{x^2} dx$ $\frac{\partial G}{\partial x} = $		the union of C1 & C2.	
(ii) For $n=1$ we have $y=x^2$ & here $dy=2xdx$ .  Thus, writing $T_1$ in terms of $X$ we have $T_1 = \int_0^1 \frac{2x^8}{2x^2} dx - 3c^7 2x dx = 0$ $2xc^2 = \int_0^1 \frac{2x^8}{2x^2} dx - 3c^7 2x dx = 0$ For $n=2$ we have $y^2=x \Rightarrow 2ydy=dx$ writing $T_2$ in terms of $y$ we have $T_2 = \int_0^1 (2y^2)^2 dy - \frac{1}{2} \frac{y^3}{y^2} dy$ $= \int_0^1 (2y^2)^2 dy - \frac{1}{2} \frac{y^3}{y^2} dx$ $= \int_0^1 (2y^2)^2 dy - \frac{1}{2} \frac{y^3}{y^2} dy$ $= \int_0^1 (2y^2)^2 dy - \frac{1}{2} y$		(0,0) x C, goes from (0,0) to (1,1)	5
Thus, writing $T_1$ in terms of $y$ we have $T_1 = \int_0^1 \frac{2x^8}{2x^2} dx - 3c^7 2x dx = 0$ For $n=2$ we have $y^2=x \Rightarrow 2y dy = dx$ Writing $T_2$ in terms of $y$ we have $T_2 = \int_0^0 \frac{y^4}{(y^2)^2} dy dy - \frac{1}{2} \frac{y^3}{y^2} dy$ $= \int_0^0 (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[ \frac{y^2}{2} \right]_0^0 = -\frac{3}{4}$ (iii) We have $f = \frac{y^4}{x^2}$ , $Q = -\frac{1}{2}\frac{y^3}{x}$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2}\frac{y^3 - 4y^3}{x^2} = -\frac{7}{4}\frac{y^3}{2}$ Solve $\int_0^0 e^{-\frac{1}{2}y} dy = \int_0^0 e^{-\frac{1}{2}y^3} dx dy$ $= \int_0^0 (2y - \frac{1}{2}y) dy = \frac{1}{2}\frac{y^3 - 4y^3}{x^2} = -\frac{7}{4}\frac{y^3}{2}$ Unseen but gimilar problems: $\int_0^0 P dx + Q dy = \int_0^0 -\frac{7}{4}\frac{y^3}{x^2} dx dy$ $= \int_0^0 \frac{y - x^3}{2}\frac{x^2}{x^2} dx dy$ $= \int_0^0 \frac{y - x^3}{2}\frac{y^3}{x^2} dx dx$ $= -\frac{7}{8}\int_0^1 (1 - x^6) dx = -\frac{3}{4}\int_0^0 \frac{y^3}{x^2} dx$ $= -\frac{7}{8}\int_0^1 (1 - x^6) dx = -\frac{3}{4}\int_0^0 \frac{y^3}{x^2} dx$ Solve $\int_0^0 = \int_0^0 \frac{y^3}{x^2} dx dx$ $= -\frac{7}{8}\int_0^1 (1 - x^6) dx = -\frac{3}{4}\int_0^0 \frac{y^3}{x^2} dx$ Setter's initials  Checker's initials  Page number		Copyright Constitution of the Copyright Copyri	
Thus, writing $T_1$ in terms of $y$ we have $T_1 = \int_0^1 \frac{2x^8}{2x^2} dx - 3c^7 2x dx = 0$ For $n=2$ we have $y^2=x \Rightarrow 2y dy = dx$ Writing $T_2$ in terms of $y$ we have $T_2 = \int_0^0 \frac{y^4}{(y^2)^2} \frac{2y}{y^2} dy - \frac{1}{2} \frac{y^3}{y^2} dy$ $= \int_0^0 (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[ \frac{y^2}{2} \right]_0^0 = -\frac{3}{4}$ (iii) We have $f = \frac{y^4}{x^2}$ , $Q = -\frac{1}{2}\frac{y^3}{x}$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2}\frac{y^3 - 4y^3}{x^2} = -\frac{7}{4}\frac{y^3}{2}$ Setter's initials  Checker's initials  Checker's initials  Page number	(ii)	For n=1 we have y=x2& herce dy=2xdx.	
For $n=2$ we have $y^2=x \Rightarrow 2y  dy = dx$ Writing $T_2$ in terms of $y$ we have $T_2 = \int_1^0 \frac{y^4}{(y^2)^2} \cdot 2y  dy - \frac{1}{2} \frac{y^3}{y^2}  dy$ $= \int_1^0 (2y - \frac{1}{2}y)  dy = \frac{3}{2} \left[ \frac{y^2}{2} \right]_1^0 = -\frac{3}{4}$ (iii) We have $f = \frac{y^4}{x^2}, Q = -\frac{1}{2} \frac{y^3}{x}$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2} \frac{y^3}{x^2} - \frac{4y^3}{x^2} = -\frac{7}{2} \frac{y^3}{x^2}$ . Unseen but gimilar problems $\int_1^0 P  dx + Q  dy = \int_1^0 \frac{7}{2} \frac{y^3}{x^2}  dx  dy$ $= \int_1^0 \frac{y = x^{1/2}}{x^2} \cdot \frac{y^3}{x^2}  dy  dx$ $= \int_1^0 \frac{y = x^{1/2}}{x^2} \cdot \frac{y^4}{x^2}  dx$ $= -\frac{7}{8} \int_1^0 (1 - x^6)  dx = -\frac{3}{4} \int_1^0 \frac{y^4}{x^2}  dx$ $= -\frac{7}{8} \int_1^0 (1 - x^6)  dx = -\frac{3}{4} \int_1^0 \frac{y^4}{x^2}  dx$ Solve $\int_1^0 \frac{1}{2} \cdot \frac{y^4}{x^2}  dx$ $= -\frac{7}{8} \int_1^0 (1 - x^6)  dx = -\frac{3}{4} \int_1^0 \frac{y^4}{x^2}  dx$ Setter's initials $\int_1^0 P  dx + Q  dy = \int_1^0 \frac{1}{2} \cdot \frac{y^4}{x^2}  dx$ $= -\frac{7}{8} \int_1^0 (1 - x^6)  dx = -\frac{3}{4} \int_1^0 \frac{y^4}{x^2}  dx$ Page number		Thus, writing I, in terms of y we have	
For $n=2$ we have $y^2=x \Rightarrow 2y  dy = dx$ Writing $T_2$ in terms of $y$ we have $T_2 = \int_1^0 \frac{y^4}{(y^2)^2} \cdot 2y  dy - \frac{1}{2} \frac{y^3}{y^2}  dy$ $= \int_1^0 (2y - \frac{1}{2}y)  dy = \frac{3}{2} \left[ \frac{y^2}{2} \right]_1^0 = -\frac{3}{4}$ (iii) We have $f = \frac{y^4}{x^2}, Q = -\frac{1}{2} \frac{y^3}{x}$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2} \frac{y^3}{x^2} - \frac{4y^3}{2x^2} = -\frac{7}{2} \frac{y^3}{x^2}$ .  Samplying Green's Theorem: $\int_1^0 P  dx + Q  dy = \int_1^0 \frac{7}{2} \frac{y^3}{x^2}  dx  dy$ $= \int_{x=0}^0 \int_{y=x^2}^{y=x^{1/2}} \frac{1}{x^2} \left[ \frac{y}{4} \right]_{x^2}^{x/2}  dx$ $= -\frac{7}{8} \int_{x=0}^{\infty} \frac{1}{x^2} \left[ \frac{y}{4} \right]_{x^2}^{x/2}  dx$ $= -\frac{7}{8} \int_{x=0}^{\infty} \frac{1}{x^2} \left[ \frac{y}{4} \right]_{x^2}^{x/2}  dx$ $= -\frac{7}{8} \int_1^0 (1-x^6)  dx = -\frac{3}{4} \int_0^0 \frac{1}{x^2}  dx$ Since $\int_0^\infty \int_0^\infty \int_0^$		$I = \int_{0}^{\infty} 2x^{8} dx - x^{7} 2x dx = 0$	3
$T_{2} = \int_{1}^{0} \frac{y^{4} \cdot 2y}{(y^{2})^{2}} dy - \frac{1}{2} \frac{y^{3}}{y^{2}} dy$ $= \int_{1}^{0} (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[ \frac{y^{2}}{2} \right]_{1}^{0} = -\frac{3}{4}$ (iii) We have $f = y^{4}/x^{2}$ , $Q = -\frac{1}{2}y^{3}/x$ $Thus \frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2} \frac{y^{3}}{x^{2}} - \frac{4}{2} \frac{y^{3}}{x^{2}} = -\frac{7}{2} \frac{y^{3}}{x^{3}} - \frac{1}{2} \frac{y^{3}}{x^{2}} - $		$\int_0^{\infty} 2x^2 \qquad 2x^2 \qquad = \qquad$	
$T_{2} = \int_{1}^{0} \frac{y^{4} \cdot 2y}{(y^{2})^{2}} dy - \frac{1}{2} \frac{y^{3}}{y^{2}} dy$ $= \int_{1}^{0} (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[ \frac{y^{2}}{2} \right]_{1}^{0} = -\frac{3}{4}$ (iii) We have $f = y^{4}/x^{2}$ , $Q = -\frac{1}{2}y^{3}/x$ $Thus \frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2} \frac{y^{3}}{x^{2}} - \frac{4}{2} \frac{y^{3}}{x^{2}} = -\frac{7}{2} \frac{y^{3}}{x^{3}} - \frac{1}{2} \frac{y^{3}}{x^{2}} - $		For $n=2$ we have $y^2=x \Rightarrow 2ydy=dx$	
$T_{2} = \int_{1}^{0} \frac{y^{4} \cdot 2y}{(y^{2})^{2}} dy - \frac{1}{2} \frac{y^{3}}{y^{2}} dy$ $= \int_{1}^{0} (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[ \frac{y^{2}}{2} \right]_{1}^{0} = -\frac{3}{4}$ (iii) We have $f = y^{4}/x^{2}$ , $Q = -\frac{1}{2}y^{3}/x$ $Thus \frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2} \frac{y^{3}}{x^{2}} - \frac{4}{2} \frac{y^{3}}{x^{2}} = -\frac{7}{2} \frac{y^{3}}{x^{3}} - \frac{1}{2} \frac{y^{3}}{x^{2}} - $		Writing Iz in tems of y we have	
$=\int_{1}^{0} (2y-\frac{1}{2}y) dy = \frac{3}{2} \left[\frac{y^{2}}{2}\right]_{1}^{0} = -\frac{3}{4}$ (iii) We have $P = \frac{y^{4}}{3}x^{2}$ , $Q = -\frac{1}{2}\frac{y^{3}}{2}x$ Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2}\frac{y^{3}-4y^{3}}{x^{2}} = -\frac{7}{2}\frac{y^{3}}{3x^{2}}$ . Unseen but Similar Problems $\int_{1}^{0} P dx + Q dy = \int_{1}^{0} \frac{7}{2}\frac{y^{3}}{x^{2}} dx dy$ $=\int_{1}^{0} \frac{1}{2}\int_{1}^{0} \frac{y^{2}}{x^{2}} dx dy$ $=\int_{1}^{0} \frac{1}{2}\int_{1}^{0} \frac{y^{2}}{x^{2}} dx dy$ $=\int_{1}^{0} \frac{1}{2}\int_{1}^{0} \frac{y^{2}}{x^{2}} dx$ $=\int_{1}^{0} \frac{y^{2}}{x^$		$I_2 = \int_0^0 y^4 \cdot 2y  dy - \frac{1}{2} y^3  dy$	
(iii) We have $P = \frac{y^4}{x^2}$ , $Q = -\frac{1}{2}\frac{y^3}{x^2}$ (Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{1}{2}\frac{y^3}{x^2} - \frac{4}{2}\frac{y^3}{x^2} = -\frac{7}{2}\frac{y^3}{x^2}$ . Unseen but Similar problems done.  Shapplying Green's Theorem: $ \int_C P dx + Q dy = \int_C -\frac{7}{2}\frac{y^3}{x^2} dx dy \\ = \int_{x=0}^{x=1} \int_{y=x^2}^{y=x^{1/2}} \frac{1}{x^2} \int_{x^2}^{y=x^{1/2}} dx \\ = -\frac{7}{8} \int_{x=0}^{x=1} \frac{1}{x^2} \int_{x^2}^{y=x^{1/2}} dx \\ = -\frac{7}{8} \int_0^1 (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{x=0} \frac{1}{x^2} \int_{x=0}^{x=0} $			
Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{i}{2} \frac{y^3}{x^2} - \frac{4y^3}{3c^2} = -\frac{7}{2} \frac{y^3}{3c^2}$ . Junseen but Similar Problems of Polyman Green's Theorem: $\int P dx + Q dy = \int \int -\frac{7}{2} \frac{y^3}{x^2} dx dy$ $= \int_{x=0}^{x=1} \int_{y=x^2}^{y=x^{1/2}} \frac{1}{x^2} \int_{x^2}^{y=x^{1/2}} \frac{1}{x^2} dx$ $= -\frac{7}{8} \int_{x=0}^{x=1} \frac{1}{x^2} \int_{x^2}^{y=x^{1/2}} \frac{1}{x^2} dx$ $= -\frac{7}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{1}{x^2} dx$ (iv) Since $\int_{C} = \int_{C_1} + \int_{C_2}^{2}$ , we have $-\frac{3}{4} = 0 - \frac{3}{4} \int_{x=0}^{8} \frac{1}{x^2} dx$ Setter's initials  Checker's initials  Page number		$= \int_{1}^{3} (2y - \frac{1}{2}y) dy = \frac{3}{2} \left[ \frac{y^{2}}{2} \right]_{1}^{3} = -\frac{3}{4}$	4
Thus $\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} = \frac{i}{2} \frac{y^3}{x^2} - \frac{4y^3}{3c^2} = -\frac{7}{2} \frac{y^3}{3c^2}$ . Junseen but Similar Problems of Polyman Green's Theorem: $\int P dx + Q dy = \int \int -\frac{7}{2} \frac{y^3}{x^2} dx dy$ $= \int_{x=0}^{x=1} \int_{y=x^2}^{y=x^{1/2}} \frac{1}{x^2} \int_{x^2}^{y=x^{1/2}} \frac{1}{x^2} dx$ $= -\frac{7}{8} \int_{x=0}^{x=1} \frac{1}{x^2} \int_{x^2}^{y=x^{1/2}} \frac{1}{x^2} dx$ $= -\frac{7}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{1}{x^2} dx$ (iv) Since $\int_{C} = \int_{C_1} + \int_{C_2}^{2}$ , we have $-\frac{3}{4} = 0 - \frac{3}{4} \int_{x=0}^{8} \frac{1}{x^2} dx$ Setter's initials  Checker's initials  Page number	(iii)	We have $P = \frac{4^4}{5c^2}$ , $Q = -\frac{1}{2}\frac{y^3}{x}$	
Solution initials of theorem: $ \int_{C} P dx + Q dy = \int_{-\frac{\pi}{8}}^{-\frac{\pi}{4}} \frac{y^3}{x^2} dx dy $ $ = \int_{x=1}^{x=1} \int_{y=x^2}^{y=x^{2}} \frac{y^3}{x^2} dy dx $ $ = \int_{x=0}^{x=1} \int_{y=x^2}^{y=x^{2}} \frac{y^3}{x^2} dy dx $ $ = -\frac{\pi}{8} \int_{x=0}^{x=1} \frac{1}{x^2} \left[ y^4 \right]_{x^2}^{x^{2}} dx $ $ = -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{80} \frac{y^8}{x^8} dx $ Setter's initials  Checker's initials  Checker's initials  Page number		- 7	
$\int_{C}^{P} dx + Q dy = \int_{-\frac{\pi}{8}}^{-\frac{\pi}{4}} \frac{y^3}{x^2} dx dy$ $= \int_{x=1}^{x=1} \int_{y=x^2}^{y=x^{1/2}} \frac{y^3}{x^2} dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{x=1} \frac{1}{x^2} \left[ y^4 \right]_{x^2}^{x/2} dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy$ (iv) Since $\int_{C} = \int_{C_1} + \int_{C_2}^{x=1} \frac{1}{x^8} \int_{x=0}^{8} \left( -\frac{3}{4} \right) \int_{x=0}^{8} \frac{y^8}{x^8} dx dy$ Setter's initials $= \int_{x=1}^{x=1} \int_{y=x^{1/2}}^{y=x^{1/2}} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dx dx dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dx dx dx dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx $			
$\int_{C}^{P} dx + Q dy = \int_{-\frac{\pi}{8}}^{-\frac{\pi}{4}} \frac{y^3}{x^2} dx dy$ $= \int_{x=1}^{x=1} \int_{y=x^2}^{y=x^{1/2}} \frac{y^3}{x^2} dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{x=1} \frac{1}{x^2} \left[ y^4 \right]_{x^2}^{x/2} dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy$ (iv) Since $\int_{C} = \int_{C_1} + \int_{C_2}^{x=1} \frac{1}{x^8} \int_{x=0}^{8} \left( -\frac{3}{4} \right) \int_{x=0}^{8} \frac{y^8}{x^8} dx dy$ Setter's initials $= \int_{x=1}^{x=1} \int_{y=x^{1/2}}^{y=x^{1/2}} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dx dy dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dx dx dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx dx dx dx dx$ $= -\frac{\pi}{8} \int_{x=0}^{1} (1-x^6) dx = -\frac{3}{4} \int_{x=0}^{8} \frac{y^8}{x^8} dx $		. Applying Green's Theorem:	
$=\int_{x=1}^{x=1}\int_{y=x}^{y=x^{1/2}}\frac{y^3}{x^2}dydx$ $=\int_{x=0}^{x=1}\int_{y=x^2}^{y=x^{1/2}}\frac{y^3}{x^2}dydx$ $=-\frac{7}{8}\int_{x=0}^{x=1}\frac{1}{x^2}\int_{x^2}^{y}dx^{1/2}dx$ $=-\frac{7}{8}\int_{x=0}^{1}(1-x^6)dx=-\frac{3}{4}\int_{x=0}^{8}\int_{x=$			
$= -\frac{7}{8} \int_{x=0}^{3c=1} \frac{1}{x^2} \left[ y^4 \right]_{x^2}^{3c} dx$ $= -\frac{7}{8} \int_{x=0}^{3c} (1-x^6) dx = -\frac{3}{4} / \frac{80}{2} $ (iv) Since $\int_{C} = \int_{C_1} + \int_{C_2} + \int_{c_2} + \int_{c_3} + \int_{c_4} + \int_{c_5} + \int_{$		C	50 5-20
$= -\frac{7}{8} \int_{x=0}^{3c=1} \frac{1}{x^2} \left[ y^4 \right]_{x^2}^{3c} dx$ $= -\frac{7}{8} \int_{x=0}^{3} (1-x^6) dx = -\frac{3}{4} / \frac{80}{2} $ (iv) Since $\int_{C} = \int_{C_1} + \int_{C_2} $ , we have $-\frac{3}{4} = 0 - \frac{3}{4} / \frac{80}{2} $ Are consistent. 2  Setter's initials  Checker's initials  Page number		$= \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left( -\frac{\pi}{2} y^3 \right) dy dsc$	20
(iv) Since $\int_{C} = \int_{C_{1}} + \int_{C_{2}} + \int_{C_{2}}$		$0 = 0  y = x^2  x^2$	
(iv) Since $\int_{C} = \int_{C_{1}} + \int_{C_{2}} + \int_{C_{2}}$		$= -\frac{7}{8} \left[ \frac{1}{x^2} \left[ y^4 \right]_{x^2} \right]_{x^2} dx$	6
Setter's initials Checker's initials Page number		$= -\frac{7}{4} (1/1-x^6) dx = -\frac{3}{4}$	
Setter's initials Checker's initials Page number	(.)	$C = C + C = 0.3 = 0.3 \times 10^{-3} = 0.3 \times 10^{$	9
	(۱۷)		Page number
0.300		ALW Checker's Initials	, age number

	EXAMINATION QUESTIONS/SOLUTIONS 2007-08	Course
		ISE 2
Question		
4		Marks & seen/unseen
Parts (i)	Poles of f(z) occur when denominator is zero.	1
	i.e. $z(3z^2+13z+4)=0$	
	$\Rightarrow Z(3z+1)(z+4) = 0$	
	⇒ Z=0, Z=-1/3, Z=-4	3
	To find order of poles:	
	At z=0: Consider /m $Z^{\alpha}f(z) = /m \frac{Z^{\alpha-1}}{3z^2+13z+4}$	
	Con a finite	unseen
	At $z=-\frac{1}{3}$ : $\lim_{z\to 0} (z+\frac{1}{3}) f(z) \neq 0$ i.e. order of pole is $1$	a
	$z \to 0$ iff $\alpha = 1$ $z = -4$ : /im $(z+4)^{\alpha}f(z) \neq 0$ So all poles are simple	Similar
		Studies
	Alternatively just state that each zero of the denominator occurs to multiplicity one	3 class
	Ros f(z) = lim zf(z) = 4	2
	$Res f(z) = \lim_{z \to 0} (2+\frac{1}{3}) \frac{1}{1} = -\frac{3}{11}$ $z = -\frac{1}{3} + \frac{1}{2} + \frac{3}{2} + \frac{1}{2} + \frac{3}{2} + \frac{1}{2} + \frac{1}$	2
	$\operatorname{Res} f(z) = \lim_{z \to -4} (z + 4) \frac{1}{z(3z+1)(2+4)} = \frac{1}{44}$	
	$z=-4$ $z \rightarrow -4$ $z(3z+1)(z+4)$ $44$	2
(ii)	Hence: $f'(F(s)) = Sum of residues$ of $F(s)$ est at poles of $F(s)$	1
	Res $F(s)e^{st} = \frac{1}{4}$ ; Res $F(s)e^{st} = -\frac{3}{11}e^{-t/3}$ S=0	
	Res $F(s)e^{st} = 1$ $e^{-4t}$ Using results obtained in (i)	
	Thus $L^{-1}(F(s)) = \frac{1}{4} - \frac{3}{11}e^{-t/3} + \frac{1}{44}e^{-4t}$	6
	Otherwise: $P.F(s) = \frac{1}{4s} + \frac{1}{44} - \frac{9}{11}$	TIO
	Invest, using tables: $f(t) = \frac{1}{4} + \frac{1}{44} e^{-4t} - \frac{3}{11} e^{-t/3}$	Total 20
	Setter's initials Checker's initials	Page number
	Agus X.wu	

2

## 5. Let

 $T_1$  - event first test passes (no memory errors detected)

 $\overline{T_1}$  - event first test fails (memory errors detected)

 $T_2$  - event second test passes (no memory errors detected)

 $\overline{T_2}$  - event second test fails (memory errors detected)

E - event that there are memory errors

 $\overline{E}$  - event that there are no memory errors

(i)

(a)

$$P(\overline{T_1}) = P(\overline{T_1} \mid E)P(E) + P(\overline{T_1} \mid \overline{E})P(\overline{E})$$
  
= 0.8 × 0.02 + 0 × 0.98 = 0.016.

(b)

$$P(E \mid \overline{T_1}) = \frac{P(\overline{T_1} \mid E)P(E)}{P(\overline{T_1})}$$
$$= \frac{0.8 \times 0.02}{0.016} = 1.$$

(c) (as expected!)

$$P(T_{1} \cap T_{2}) = P(T_{1} \cap T_{2} \mid E)P(E) + P(T_{1} \cap T_{2} \mid \overline{E})P(\overline{E})$$

$$= P(T_{1} \mid E)P(T_{2} \mid E)P(E) + P(T_{1} \mid \overline{E})P(T_{2} \mid \overline{E})P(\overline{E})$$

$$= 0.2 \times 0.01 \times 0.02 + 1 \times 1 \times 0.98 = 0.98004.$$

$$P(E \mid T_{1} \cap T_{2}) = \frac{P(T_{1} \cap T_{2} \mid E)P(E)}{P(T_{1} \cap T_{2})}$$

$$= \frac{P(T_{1} \mid E)P(T_{2} \mid E)P(E)}{P(T_{1} \cap T_{2})}$$

$$= \frac{0.2 \times 0.01 \times 0.02}{0.98004} = 4.08 \times 10^{-5}.$$

6m

YH



(ii) Let  $R_1$  = running time of first test  $R_2$  = running time of second test

$$R_1 \sim N(5, 2^2)$$
  $R_2 \sim N(60, 10^2)$   $Z \sim N(0, 1)$ 

(a)

$$P(R_1 > 6) = P\left(\frac{R_1 - 5}{2} > \frac{6 - 5}{2}\right) = P\left(Z > \frac{1}{2}\right)$$

$$= 1 - \Phi(0.5) = 1 - 0.691 = 0.309.$$
(b)

$$P(R_1 < 3) = P\left(\frac{R_1 - 5}{2} < \frac{3 - 5}{2}\right) = P(Z < -1)$$
  
=  $\Phi(-1) = 1 - \Phi(1) = 1 - 0.841 = 0.159.$ 

(c) Total test time  $R = R_1 + R_2$ .

$$R \sim N(5+60,2^2+10^2) = N(65,104)$$

(d) Given

$$\overline{x} = 5.24, s = 2.12, t_0 = t_{n-1.0.05} = 2.26.$$

95% CI for mean:

$$\left(\overline{x} - t_0 \frac{s}{\sqrt{n}}, \overline{x} + t_0 \frac{s}{\sqrt{n}}\right) = \left(5.24 - 2.26 \times \frac{2.12}{\sqrt{10}}, 5.24 + 2.26 \times \frac{2.12}{\sqrt{10}}\right) \\
= (3.725, 6.755)$$

this interval contains the reported mean value of 5 minutes, so we would fail to reject a hypothesis that the mean is 5 minutes at the 5% level.



3

6m

YH



6. (i) (a)

$$\int_{-\infty}^{\infty} f(t) \, \mathrm{d}t = \int_{0}^{\infty} \lambda \beta(\lambda t)^{\beta-1} e^{-(\lambda t)^{\beta}} \, \mathrm{d}t = \left[ -e^{-(\lambda t)^{\beta}} \right]_{0}^{\infty} = 1,$$

and 
$$f(t) \ge 0 \ \forall t \ge 0$$
 as  $\lambda, \beta \ge 0$ .

(b) Reliability:

$$R(t) = P(T > t) = \int_{t}^{\infty} \lambda \beta (\lambda t_0)^{\beta - 1} e^{-(\lambda t_0)^{\beta}} dt_0$$
$$= \left[ -e^{-(\lambda t_0)^{\beta}} \right]_{t}^{\infty} = e^{-(\lambda t)^{\beta}}$$

Hazard:

$$h(t) = \frac{f(t)}{R(t)} = \frac{\lambda \beta (\lambda t)^{\beta - 1} e^{-(\lambda t)^{\beta}}}{e^{-(\lambda t)^{\beta}}} = \lambda \beta (\lambda t)^{\beta - 1}$$
(c)

$$P(T > t_0 + t \mid T > t_0) = \frac{P(T > t_0 + t \cap T > t_0)}{P(T > t_0)}$$

$$= \frac{P(T > t_0 + t)}{P(T > t_0)} = \frac{e^{-(\lambda(t + t_0))^{\beta}}}{e^{-(\lambda t_0)^{\beta}}}$$

$$= e^{(\lambda t_0)^{\beta} - (\lambda(t + t_0))^{\beta}}$$
3

- (d) Now,  $P(T > t) = e^{-(\lambda t)^{\beta}}$ . "memoryless" when  $P(T > t_0 + t \mid T > t_0) = P(T > t)$ . From part (c), this occurs when  $\beta = 1$ , (and, of course trivially when  $t_0 = 0$ !) giving  $T \sim Exponential(\lambda)$ .
- (ii) Let R be the reliability at 30 minutes (=0.5 hours). Let  $A, B_1, B_2$  be the events that the corresponding component is operating at 30 minutes.

$$P(T > t) = e^{-(\lambda t)^{\beta}} \Rightarrow P\left(T > \frac{1}{2}\right) = e^{-(\frac{\lambda}{2})^{\beta}}$$

Giving,

$$P(A_1) = e^{-(\frac{0.5}{2})^{0.8}} = 0.7190; \quad P(B_1) = P(B_2) = e^{-(\frac{0.5}{2})^{0.5}} = 0.6065.$$

$$R = P(A_1 \cap (B_1 \cup B_2)) = P(A_1)P(B_1 \cup B_2)$$

$$= P(A_1)(P(B_1) + P(B_2) - P(B_1 \cap B_2))$$

$$= P(A_1)(P(B_1) + P(B_2) - P(B_1)P(B_2))$$

$$= 0.7190 \times (0.6065 + 0.6065 - 0.6065^2) = 0.6077.$$



YH

2