Q. 6 (a) A continuous random variable X has probability density function

$$f_X(x) = \begin{cases} cxe^{-x/2} & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Find the probability $P[0 \leq X \leq 4]$, and $P[-2 \leq X \leq 2]$.

4 marks

(b) A random process W(t) is defined as

$$Z(t) = X_1 \cos(2\pi f_0 t) + X_2 \sin(2\pi f_0 t)$$

where X_1 and X_2 are uncorrelated random variables, haveig 0 mean and variance σ^2. Find the autocorrelation function $R_z(t,\tau)$. Comment whether Z(t) is WSS or not? **6 marks**