Assignment 7

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Outline

Question

The process $x(t)$ is WSS and normal with E{x(t)}=0 and $R(\tau) = 4e^{-2|\tau|}$

a)Find P{x(t)$\leq$ 3}

b)Find E{[x(t+1)-x(t-1)]^2}

Answer

(a)The RV x(t) is normal with zero mean and variance with

$$E\{x^2(t)\} = R(0) = 4 \tag{1}$$

$$\textit{Hence it is in } N(0,2) \textit{ and} \tag{2}$$

$$P\{x(t) \leq 3\} = F(3) \tag{3}$$

$$\implies P\{x(t) \leq 3\} = G(1.5) \tag{4}$$

$$\textit{using zTable} \tag{5}$$

$$\therefore P\{x(t) \leq 3\} = 0.933 \tag{6}$$

(b)

$$E\{[x(t+1)-x(t-1)]^2\} = 2[R(0)-R(2)] \tag{7}$$
$$= 2[4e^{-2|(0)|} - 4e^{-2|(2)|}] \tag{8}$$
$$= 2[4\cdot 1 - 4\cdot e^{-4}] \tag{9}$$
$$= 8[1-e^{-4}] \tag{10}$$
$$\therefore E\{[x(t+1)-x(t-1)]^2\} = 8[1-e^{-4}] \tag{11}$$