AI1110
Assignment 7

Bandaru Naresh Kumar
AI21BTECH11006

Outline

Exercise 9.23

Show that if X(t) is normal with autocorrelation $R(\tau)$, then

$$P\{X'(t) \leq a\} = G\left[\frac{a}{\sqrt{-R''(0)}}\right]$$

Solution

Given,
The RV $X'(t)$ is normal with zero mean and variance.

$$E\{|X'(t)|^2\} = R_{X'X'}(0) \tag{1}$$
$$= -R''(0) \tag{2}$$

Answer

Hence,

$$P\{X'(t) \leq a\} = F_{X'}(a) \tag{3}$$

$$= G\left[\frac{a}{\sqrt{E\{|X'(t)|^2\}}}\right] \tag{4}$$

$$= G\left[\frac{a}{\sqrt{-R''(0)}}\right] \tag{5}$$