ECE-GY 6303, Probability & Stochastic Processes
Homework # 4

Prof. Pillai

Fall 2021

Problem 1

The random variable X is $\mathcal{N}(5, 2)$ and $Y = 2X + 4$. Find the mean, variance of Y and $f_Y(y)$.

Problem 2

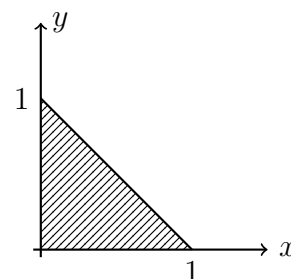The random variable X is $P(5)$ and $Y = 2X + 4$. Find the mean, variance of Y and $f_Y(y)$.

Problem 3

a. Given the joint probability density function $f_{XY}(x, y)$ as,

$$f_{XY}(x, y) = \begin{cases} kxy, & (x, y) \in \text{shaded area} \\ 0 & \text{otherwise} \end{cases}$$
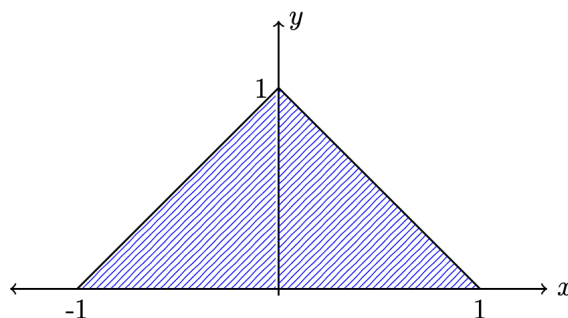

a. Find k, $f_X(x)$ and $f_Y(y)$.

b. Are X and Y independent?

Problem 4

X and Y are jointly distributed random variables with joint p.d.f

$$f_{XY}(x, y) = \begin{cases} e^{-x} & \infty > x > y > 0 \\ 0 & \text{otherwise} \end{cases}$$

a. Find $f_X(x)$ and $f_Y(y)$.

b. Are X and Y independent?

Problem 5

X and Y are jointly distributed random variables with joint p.d.f

$$f_{XY}(x,y) = \begin{cases} k & 0 < x < y < a \\ 0 & \text{otherwise} \end{cases}$$

a. Find k, $f_X(x)$ and $f_Y(y)$.

b. Are X and Y independent?

Problem 6

a. X and Y are jointly distributed random variables with joint p.d.f

$$f_{XY}(x,y) = \begin{cases} e^{-(x+y)} & x \geq 0, y \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Are X and Y independent?

b. Given the joint probability dendity function $f_{XY}(x,y)$ as

$$f_{XY}(x,y) = \frac{1}{2\pi} e^{-(x^2+y^2)/2}.$$

Show that X and Y are independent random variables