



1. Give short answers of the following questions.

1. Write down the pdf of Gaussian distribution.
2. A bag contains 5 white balls and 3 black balls. Two balls are drawn at random one after the other. Find the probability that the both balls drawn are black.
3. You are given a function $f(x) = \frac{xx^3}{3}$ for $x - 1 < x < 2$, The function takes a value of zero elsewhere. Can this function be a PDF?
4. What are the fundamental axioms of a probability space.
5. X is a random variable with variance σ and mean μ . $Y = -2X + 3$. Find the $Cov(X, Y)$

[10]

2. The thickness X of the coating of a conductor follows a uniform distribution, with X lying between 20 and 40 mm. Find the probability that the coating is greater than 35 mm. What is the average value of X? Find out the variance of X

[5]

3. You are tossing a fair coin 10 times. Find the probability that you will get

1. 7 heads and 3 tails
2. 7 heads
3. At least 1 head
4. Not more than 1 tail

[10]

4. Let X be a random variable with the PDF

$$\begin{aligned} f(x) &= \beta e^{-\beta} \quad \text{for } x > 0 \\ &= 0 \quad \text{otherwise} \end{aligned}$$

Find

1. Moment generating function of X
2. $E(X)$ and $Var(X)$

[15]

5. If two random variable X and Y have the joint pdf

$$\begin{aligned} f_{X,Y}(x, y) &= x + y \quad \text{for } 0 < x < 1, 0 < y < 1 \\ &= 0 \quad \text{otherwise} \end{aligned}$$

Check whether X and Y and independent.

[10]
