

1. Let X be a discrete random variable with probability mass function p given by

$$p(0) = 1/6, p(1) = 1/3, p(2) = 1/3, p(3) = 1/6$$

- (a) Find $E(X)$.
(b) Find $E(X^2)$.
(c) Find $V(X)$.
(d) Find $F(x)$, the cumulative distribution function of X .
(e) Suppose that we define a new random variable Y by $Y = X - 1$. Find $P(Y = 0)$.

(15 points)

2. Let X be a continuous random variable with the probability density function

$$f(x) = \begin{cases} 2(1-x), & 0 \leq x \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

- (a) Find $E(X)$.
(b) Find $V(X)$.
(c) Find $F(x)$, the cumulative distribution function of X .
(d) Find the median of X .

(20 points)

3. A bridge hand consists of 13 cards (out of a 52 card deck) dealt at random.

- (a) What is the probability that a bridge hand will contain no hearts?
(b) What is the probability that a bridge hand will contain only face cards (ie will contain only jacks, queens, kings and aces)?
(c) What is the probability that a bridge hand will contain all four aces?

(15 points)