



Name: _____ **Date:** _____ **Score:** _____ / 62

1 The discrete random variable X has the probability distribution

x	1	2	3	4
$P(X = x)$	0.15	0.3	k	0.2

- Find the value of k .
- Find $P(X \geq 2)$.
- Find $P(1 < X < 4)$.

(3 marks)

Answer _____

2 A fair spinner has eight equal sections numbered 1 to 8. The random variable X is the number the spinner lands on.

- Write down the probability distribution of X .
- Find $P(X > 5)$.
- Find the probability that X is a prime number.

(3 marks)

Answer _____

3 The discrete random variable X has probability function

$$P(X = x) = kx \quad \text{for } x = 1, 2, 3, 4, 5$$

where k is a constant.

- Find the value of k .
- Find $P(X = 4)$.
- Find $P(X \leq 2)$.

(4 marks)

Answer _____

4 The discrete random variable X has the probability distribution

x	0	1	2	3	4
$P(X = x)$	0.1	a	0.25	b	0.15

where a and b are constants. Given that $P(X \leq 1) = P(X \geq 3)$

- find the value of a and the value of b
- find $P(1 \leq X < 4)$.

(5 marks)

Answer _____

- 5 The discrete random variable X takes the values 1, 2, 3, 4 and 5 only. Its cumulative distribution function $F(x) = P(X \leq x)$ is given in the table.

x	1	2	3	4	5
$F(x)$	0.2	0.45	0.7	0.9	1

- a. Find $P(X = 3)$.
b. Find the probability distribution of X .
c. Find $P(X > 2)$.

(5 marks)

Answer _____

- 6 The discrete random variable X has probability function

$$P(X = x) = k(x^2 + 1) \quad \text{for } x = 0, 1, 2, 3$$

- a. Show that $k = \frac{1}{18}$
b. Find $P(X \geq 2)$.
c. Two independent observations X_1 and X_2 are taken of X . Find $P(X_1 + X_2 = 3)$.

(6 marks)

Answer _____

7 A bag contains 3 red counters and 2 blue counters. Ravi takes two counters at random from the bag without replacement. The random variable R is the number of red counters he takes.

- a. Find the probability distribution of R .
- b. Find $P(R \leq 1)$.

(5 marks)

Answer _____

8 Two fair four-sided dice, each numbered 1 to 4, are rolled. The random variable S is the larger of the two scores (if the scores are equal, S is that score).

- a. Explain why $P(S \leq s) = \frac{s^2}{16}$ for $s = 1, 2, 3, 4$
- b. Hence show that $P(S = s) = \frac{2s-1}{16}$ for $s = 1, 2, 3, 4$
- c. Find $P(S \geq 3)$.

(6 marks)

Answer _____

9 The discrete random variable X has probability function

$$P(X = x) = kx \quad \text{for } x = 1, 2, 3$$

$$P(X = x) = k(7 - x) \quad \text{for } x = 4, 5, 6$$

where k is a constant.

- Find the value of k .
- Find $P(2 < X \leq 5)$.
- Find the probability that X is even.

(5 marks)

Answer _____

10 In a game, Megan rolls a fair six-sided die until she gets a six, but she stops after 3 rolls even if she has not got a six. The random variable X is the number of times she rolls the die.

- Find the probability distribution of X .
- Find $P(X \geq 2)$.
- Megan and Tomasz each play the game once, independently. Find the probability that they roll the die the same number of times.

(6 marks)

Answer _____

11 The random variable X has a discrete uniform distribution over the integers $1, 2, 3, \dots, n$.

Given that $P(X \leq 6) = 0.4$

- find the value of n
- find $P(4 < X < 11)$
- find the probability that two independent values of X are both greater than 12.

(6 marks)

Answer _____

12 The discrete random variable X has probability function

$$P(X = x) = \frac{k}{x} \quad \text{for } x = 1, 2, 3, 6$$

- Show that $k = \frac{1}{2}$
- Find $P(X > 1)$.
- Two independent observations X_1 and X_2 are taken of X . Find $P(X_1 X_2 = 6)$.
- A single value g of X is taken and used in the equation $t^2 + gt + 4 = 0$. Find the probability that this equation has real roots.

(8 marks)

Answer _____

End of questions | Total 62 marks