



Discrete Random Variables

Questions

Suitable for:
Pearson Edexcel International A-Level (iAL) — Statistics 1



Question 1

The discrete random variable X has the probability distribution shown below.

x	1	2	3	4
$P(X = x)$	0.1	0.3	k	0.2

(a) Find the value of k .

(2 marks)

(b) Find $P(X > 2)$.

(2 marks)

Total for question = 4 marks





Question 2

The discrete random variable X has the probability distribution shown below, where a and b are constants.

x	0	1	2	3	4
$P(X = x)$	0.1	a	b	0.2	0.1

Given that $P(X \leq 1) = 0.35$,

(a) find the value of a and the value of b ,

(3 marks)

(b) find $P(1 \leq X \leq 3)$.

(2 marks)

Total for question = 5 marks



Question 3

The discrete random variable X has the probability distribution shown below.

x	0	1	2	3
$P(X = x)$	0.1	0.3	0.4	0.2

(a) Find $E(X)$.

(2 marks)

(b) Find $\text{Var}(X)$.

(3 marks)

Total for question = 5 marks



Question 4

The discrete random variable X has probability function

$$P(X = x) = \frac{x}{10} \quad x = 1, 2, 3, 4$$

(a) Show that this is a valid probability distribution.

(1 marks)

(b) Find $E(X)$ and $\text{Var}(X)$.

(4 marks)

Total for question = 5 marks





Question 5

The discrete random variable X has $E(X) = 3$ and $\text{Var}(X) = 4$.

Find

(a) $E(2X + 1)$,

(1 marks)

(b) $\text{Var}(2X + 1)$,

(1 marks)

(c) $E(3 - X)$,

(1 marks)

(d) $\text{Var}(3 - X)$.

(1 marks)

Total for question = 4 marks





Question 6

The discrete random variable X is such that

$$E(2X - 3) = 7 \quad \text{Var}(3X + 1) = 36$$

(a) Find $E(X)$.

(2 marks)

(b) Find $\text{Var}(X)$.

(2 marks)

Total for question = 4 marks





Question 7

The discrete random variable X has the probability distribution shown below.

x	1	2	3	4	5
$P(X = x)$	0.15	0.25	0.30	0.20	0.10

(a) Write down the cumulative distribution function $F(x)$.

(2 marks)

(b) Find $P(X \leq 3)$.

(1 marks)

(c) Find $P(1 < X \leq 4)$.

(2 marks)

Total for question = 5 marks





Question 8

The cumulative distribution function of a discrete random variable X is given by

x	1	2	3	4
$F(x)$	0.20	0.50	0.80	1.00

(a) Write down the probability distribution of X .

(2 marks)

(b) Find $E(X)$.

(2 marks)

Total for question = 4 marks





Question 9

The discrete random variable X follows a discrete uniform distribution on the values 1, 2, 3, ..., n .

Given that $E(X) = 5$,

(a) find the value of n ,

(2 marks)

(b) find $\text{Var}(X)$,

(2 marks)

(c) find $P(X > 4)$.

(1 marks)

Total for question = 5 marks



Question 10

The discrete random variable X follows a discrete uniform distribution on the integer values a , $a+1$, $a+2$, ..., b .

Given that $E(X) = 7$ and $\text{Var}(X) = 10$,

(a) show that $b - a = 10$,

(3 marks)

(b) find the value of a and the value of b .

(2 marks)

Total for question = 5 marks





Question 11

The discrete random variable X has probability function

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

(a) Show that $k = 1/18$.

(2 marks)

(b) Find $E(X)$ and $\text{Var}(X)$, giving your answers as fractions.

(5 marks)

Total for question = 7 marks



Question 12

The discrete random variable X has the probability distribution shown below, where p and q are constants.

x	0	1	2	3	4
$P(X = x)$	0.1	p	0.3	q	0.1

Given that $E(X) = 1.8$,

(a) show that $p + 3q = 0.8$,

(2 marks)

(b) find the value of p and the value of q ,

(3 marks)

(c) find $\text{Var}(X)$,

(3 marks)

(d) find $E(3X - 2)$ and $\text{Var}(3X - 2)$.

(3 marks)

Total for question = 11 marks



Question 13

The discrete random variable X has the probability distribution shown below, where a and b are constants.

x	1	2	3	4	5
$P(X = x)$	a	0.2	b	0.2	0.1

Given that $E(X) = 2.8$,

(a) show that $a + 3b = 1.1$,

(2 marks)

(b) find the value of a and the value of b ,

(3 marks)

(c) find $\text{Var}(X)$,

(3 marks)

(d) find $P(X > E(X))$.

(2 marks)

Total for question = 10 marks