Please stick the barcode label here.

TUTGATHER PRACTICE PAPER

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

MATHEMATICS Extended Part Module M1
PAPER

Question-Answer Book

Candidate Number

TUTGATHER
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

Topic practice: Discrete Random Variables

INSTRUCTIONS

(1) This paper consists of THREE sections, A(1), A(2) and B.

(2) Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.

(3) Unless otherwise specified, all working must be clearly shown.

(4) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

(5) The diagrams in this paper are not necessarily drawn to scale.

(6) Calculators and mathematical drawing instruments may be used.

(7) The marks for each question are shown in brackets.

(8) No extra time will be given after the 'Time is up' announcement.

TUTGATHER

SECTION A(1) (16 marks)

1. The probability distribution of a discrete random variable X is given by $P(X = x) = kx$ for $x = 1, 2, 3, 4$, and $P(X = x) = 0$ otherwise, where k is a constant. Find the value of k. **(3 marks)**

2. Let Y be a discrete random variable with probability mass function $P(Y = y) = \frac{y}{10}$ for $y = 1, 2, 3, 4$. Find $P(Y \geq 3)$. **(3 marks)**

3. A discrete random variable X has probability distribution $P(X = 0) = 0.2$, $P(X = 1) = 0.5$, $P(X = 2) = 0.3$. Find $E(X)$ and $\text{Var}(X)$. **(4 marks)**

Answers written in the margins will not be marked.
Answers written in the margins will not be marked.
TUTGATHER

4. The discrete random variable X has the following probability distribution: **(6 marks)**

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

Find $E(2X + 1)$ and $\text{Var}(2X + 1)$.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

SECTION A(2) (24 marks)

5. The discrete random variable X has probability mass function **(7 marks)**

$$P(X = x) = \begin{cases} k(x + 1), & x = 0, 1, 2, 3, \\ 0, & \text{otherwise,} \end{cases}$$

where k is a constant.

(a) Find the value of k.

(b) Find $P(X \leq 2)$.

(c) Find $E(X)$.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

6. A discrete random variable X has the probability distribution **(8 marks)**

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

(a) Find $E(X)$ and Var(X).
(b) Find $E(3X - 2)$ and Var$(3X - 2)$.
(c) Find $E(X^2 + 1)$.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

7. The discrete random variable X has probability mass function **(9 marks)**

$$P(X = x) = \begin{cases} c(x + 2), & x = -1, 0, 1, 2, \\ 0, & \text{otherwise,} \end{cases}$$

where c is a constant.

(a) Find c.

(b) Find $E(X)$ and Var(X).

(c) Find $E(2X + 3)$ and Var($2X + 3$).

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

SECTION B (10 marks)

8. The discrete random variable X has probability mass function **(10 marks)**

$$P(X = x) = \begin{cases} k(x+1)^2, & x = 0, 1, 2, 3, \\ 0, & \text{otherwise,} \end{cases}$$

where k is a constant.

(a) Show that $k = \frac{1}{30}$.

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

(c) Find $E(5 - 2X)$ and $\text{Var}(5 - 2X)$.

(d) Find $P(X \leq E(X))$.

END OF PAPER

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER