AQA – Discrete random variable and expectation – AS Further Mathematics Statistics

1. June/2020/Paper_2/No.1

The discrete random variable X has the following probability distribution function.

$$\mathrm{P}(X = x) = \begin{cases} 0.2 & x = 1 \\ 0.3 & x = 2 \\ 0.1 & x = 3,\ 4 \\ 0.25 & x = 5 \\ 0.05 & x = 6 \\ 0 & \text{otherwise} \end{cases}$$

Find the mode of X.

Circle your answer.

[1 mark]

0.1 0.25 2 3

2. June/2020/Paper_2/No.5

The discrete random variable X has the following probability distribution.

x	2	4	6	9
$P(X = x)$	0.2	0.6	0.1	0.1

(a) Find $P(X \leq 6)$

[1 mark]

(b) Let $Y = 3X + 2$

Show that $\text{Var}(Y) = 32.49$

[5 marks]

(c) The continuous random variable T is independent of Y.

Given that $\text{Var}(T) = 5$, find $\text{Var}(T + Y)$

[1 mark]

3. June/2019/Paper_2/No.1

The discrete random variable X has the following probability distribution function

$$\text{P}(X = x) = \begin{cases} \frac{5 - x}{10} & x = 1, 2, 3, 4 \\ 0 & \text{otherwise} \end{cases}$$

Find $\text{P}(X \geq 3)$

Circle your answer.

[1 mark]

0.1 0.15 0.2 0.3

4. June/2019/Paper_2/No.5

The discrete random variable X has the following probability distribution function

$$P(X = x) = \begin{cases} \frac{1}{n} & x = 1, 2, \ldots, n \\ 0 & \text{otherwise} \end{cases}$$

(a) (i) Prove that $E(X) = \frac{n+1}{2}$

[3 marks]

(a) (ii) Prove that $\text{Var}(X) = \frac{n^2 - 1}{12}$

[4 marks]

(b) State **two** conditions under which a discrete uniform distribution can be used to model the score when a cubic dice is rolled.

[2 marks]