

CIE  
Further Probability & Statistics  
分类真题  
2020-2022 册

A Level Clouds 出品

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# **Chapter 1**

## Continuous Random Variables

**Q1: 9231/41/S20**

- 3 The continuous random variable  $X$  has probability density function  $f$  given by

$$f(x) = \begin{cases} \frac{3}{16}(2 - \sqrt{x}) & 0 \leq x < 1, \\ \frac{3}{16\sqrt{x}} & 1 \leq x \leq 9, \\ 0 & \text{otherwise.} \end{cases}$$

- (a) Find  $E(X)$ .

[3]

The random variable  $Y$  is such that  $Y = \sqrt{X}$ .

- (b) Find the probability density function of  $Y$ .

[5]

**Q2: 9231/43/S20**

- 3** The continuous random variable  $X$  has probability density function  $f$  given by

$$f(x) = \begin{cases} \frac{1}{5}x & 0 \leq x < 2, \\ \frac{2}{15}(5-x) & 2 \leq x \leq 5, \\ 0 & \text{otherwise.} \end{cases}$$

- (a) Find the cumulative distribution function of  $X$ .

[3]

- (b) Find the median value of  $X$ .

[2]

(c) Find  $E(X^2)$ .

[2]

A large, faint watermark is printed across the page. The text "VehicleClouds" is repeated in a diagonal, slanted font, with each word appearing twice. The watermark is composed of a light gray color and is set against a white background.

(d) Find  $P(1 \leq X \leq 3)$ .

[2]

**Q3: 9231/41/W20**

- 6 The continuous random variable  $X$  has cumulative distribution function  $F$  given by

$$F(x) = \begin{cases} 0 & x < 0, \\ \frac{1}{60}(16x - x^2) & 0 \leq x \leq 6, \\ 1 & x > 6. \end{cases}$$

- (a) Find the interquartile range of  $X$ .

[4]

- (b) Find  $E(X^3)$ .

[4]

The random variable  $Y$  is such that  $Y = \sqrt{X}$ .

- (c) Find the probability density function of  $Y$ .

[3]

**Q4: 9231/42/W20**

- 4 The continuous random variable  $X$  has cumulative distribution function  $F$  given by

$$F(x) = \begin{cases} 0 & x < 2, \\ \frac{1}{60}x^2 - \frac{1}{15} & 2 \leq x \leq 8, \\ 1 & x > 8. \end{cases}$$

- (a) Find  $P(3 \leq X \leq 6)$ . [1]

The image consists of a series of horizontal dotted lines spaced evenly across the frame. Overlaid on these lines are several large, semi-transparent gray rectangles. These rectangles are tilted at approximately a 45-degree angle and overlap each other in a staggered, non-uniform manner. The rectangles vary in size, with some being larger and more prominent in the center-right area. The entire graphic has a clean, minimalist, and slightly abstract feel.

- (b) Find  $E(\sqrt{X})$ . [3]

A large, faint watermark is printed across the page. It features the word "Alevé" in a stylized, rounded font, repeated twice. Below it, the word "Clouds" is written in a similar font. The text is oriented diagonally from the bottom-left towards the top-right. The watermark is composed of several layers of gray text, creating a subtle, textured effect.

(c) Find  $\text{Var}(\sqrt{X})$ .

[2]

(d) The random variable  $Y$  is defined by  $Y = X^3$ . Find the probability density function of  $Y$ .

[3]

## **Q5: 9231/41/S21**

- 3 The continuous random variable  $X$  has cumulative distribution function  $F$  given by

$$F(x) = \begin{cases} 0 & x < 0, \\ \frac{1}{81}x^2 & 0 \leq x \leq 9, \\ 1 & x > 9. \end{cases}$$

- (a) Find  $E(\sqrt{X})$ . [3]

(b) Find  $\text{Var}(\sqrt{X})$ . [2]