1. Nov/2021/Paper_9709/61/No.4

A random variable X has probability density function given by

$$f(x) = \begin{cases} \frac{1}{18}(9 - x^2) & 0 \leqslant x \leqslant 3, \\ 0 & \text{otherwise.} \end{cases}$$

(a) Find $P(X < 1.2)$. [3]

(b) Find $E(X)$. [3]

The median of X is m.

(c) Show that $m^3 - 27m + 27 = 0$. [3]

2. Nov/2021/Paper_9709/62/No.7

(a) The probability density function of the random variable X is given by

$$f(x) = \begin{cases} kx(4-x) & 0 \leqslant x \leqslant 2, \\ 0 & \text{otherwise,} \end{cases}$$

where k is a constant.

(i) Show that $k = \frac{3}{16}$. [3]

(ii) Find $E(X)$. [3]

(b) The random variable Y has the following properties.

- Y takes values between 0 and 5 only.
- The probability density function of Y is symmetrical.

Given that $P(Y < a) = 0.2$, find $P(2.5 < Y < 5 - a)$ illustrating your method with a sketch on the axes provided. [3]