7. A continuous random variable X has probability density function defined as

$$f(x) = \begin{cases} k(x-3)^2 & 2 \leqslant x \leqslant 6 \\ 0 & \text{otherwise} \end{cases}$$

(a) Sketch the graph of $y = f(x)$

(2)

(b) Hence write down the mode of X

(1)

(c) Using algebraic integration and showing your working clearly

(i) show that $k = \frac{3}{28}$

(4)

(ii) verify that the upper quartile of X lies between 5.71 and 5.72

(3)

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Question 7 continued

Question 7 continued

(Total for Question 7 is 10 marks)

TOTAL FOR PAPER: 75 MARKS

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