5. The continuous random variable X has cumulative distribution function given by

$$\mathrm{F}(x) = \begin{cases} 0 & x < 3 \\ \frac{1}{6}(x-3)^2 & 3 \leqslant x < 4 \\ \frac{x}{3} - \frac{7}{6} & 4 \leqslant x < c \\ 1 - \frac{1}{6}(d-x)^2 & c \leqslant x < 7 \\ 1 & x \geqslant 7 \end{cases}$$

where c and d are constants.

(a) Show that $c = 6$

(4)

(b) Find $\mathrm{P}(X > 3.5)$

(2)

(c) Find $\mathrm{P}(X > 4.5 \,|\, 3.5 < X < 5.5)$

(3)

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Question 5 continued

(Total for Question 5 is 9 marks)