5. The continuous random variable X has a probability density function given by

$$f(x) = \begin{cases} \frac{1}{4}(3 - x) & 1 \leqslant x \leqslant 2 \\ \frac{1}{4} & 2 < x \leqslant 3 \\ \frac{1}{4}(x - 2) & 3 < x \leqslant 4 \\ 0 & \text{otherwise} \end{cases}$$

The cumulative distribution function of X is $F(x)$

(a) Show that $F(x) = \frac{1}{4}\left(3x - \frac{x^2}{2}\right) - \frac{5}{8}$ for $1 \leqslant x \leqslant 2$

(2)

(b) Find $F(x)$ for all values of x

(5)

(c) Find $P(1.2 < X < 3.1)$

(2)

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Question 5 continued

(Total for Question 5 is 9 marks)