5. **In this question solutions relying entirely on calculator technology are not acceptable.**

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

$$f(x) = \begin{cases} \frac{2}{21}x & 0 \leqslant x \leqslant k \\ \frac{2}{15}(6 - x) & k < x \leqslant 6 \\ 0 & \text{otherwise} \end{cases}$$

(a) Show that $k = 3.5$
You must make your method clear and show all stages of your working.

(5)

(b) Use algebraic integration to find $E(X)$
You must show all stages of your working.

(4)

Given that $E(X^2) = \frac{277}{24}$

(c) find $\text{Var}(X)$

(2)

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Question 5 continued

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Question 5 continued

(Total for Question 5 is 11 marks)