2. A random variable X has probability density function given by

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

where k is a positive constant.

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

(2)

(b) By forming and solving an equation in k, show that $k = 1.25$

(4)

(c) Use calculus to find $E(X)$

(4)

(d) Calculate the interquartile range of X

(5)

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(Total for Question 2 is 15 marks)

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