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

$$\mathrm{f}(x) = \begin{cases} k & 0 \leqslant x < 1, \\ kx & 1 \leqslant x \leqslant 2, \\ 0 & \text{otherwise,} \end{cases}$$

where k is a constant.

(a) Show that $k = \frac{2}{5}$. [1]

(b) Find the interquartile range of X. [5]

(c) Find $\mathrm{Var}(X)$. [4]