The continuous random variable X has cumulative distribution function F given by

$$\mathrm{F}(x) = \begin{cases} 0 & x < 2, \\ \dfrac{(x-2)^2}{12} & 2 \leqslant x < 4, \\ 1 - \dfrac{(8-x)^2}{24} & 4 \leqslant x \leqslant 8, \\ 1 & x > 8. \end{cases}$$

(a) Sketch the graph of the probability density function of X. [3]

(b) Find $\mathrm{E}(X)$. [3]

(c) Find the exact value of the interquartile range of X. [4]