2. The continuous random variable X has cumulative distribution function $\mathrm{F}(x)$ given by

$$\mathrm{F}(x) = \begin{cases} 0 & x < -3 \\ k(x+3) & -3 \leqslant x \leqslant 5 \\ 1 & x > 5 \end{cases}$$

where k is a positive constant.

(a) Show that $k = \frac{1}{8}$

(2)

(b) Find

(i) $\mathrm{P}(X > 2)$

(ii) $\mathrm{P}(X = 5)$

(3)

(c) Specify the probability density function of X, for all values of x

(3)

(d) State the name of this probability distribution.

(1)

(e) Find

(i) $\mathrm{E}(X)$

(ii) $\mathrm{Var}(X)$

(3)

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Question 2 continued

(Total for Question 2 is 12 marks)