4 A continuous random variable X has cumulative distribution function F given by

$$\mathrm{F}(x) = \begin{cases} 0 & x < 1, \\ \frac{1}{5}x + a & 1 \leqslant x < 4, \\ \frac{1}{50}x^2 + b & 4 \leqslant x \leqslant 6, \\ 1 & x > 6, \end{cases}$$

where a and b are constants.

(a) Find the value of a and the value of b. [2]

(b) Find the probability density function of X. [2]

(c) Given that $\mathrm{E}(X) = \frac{529}{150}$, find $\mathrm{Var}(X)$. [3]

(d) Find the 10th and 90th percentiles of X. [3]