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

$$F(x) = \begin{cases} 0 & x < 2, \\ \frac{1}{60}x^2 - \frac{1}{15} & 2 \leqslant x \leqslant 8, \\ 1 & x > 8. \end{cases}$$

(a) Find $P(3 \leqslant X \leqslant 6)$. [1]

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

(c) Find $Var(\sqrt{X})$. [2]

(d) The random variable Y is defined by $Y = X^3$. Find the probability density function of Y. [3]