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

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

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