

The random variable  $X$  has probability density function  $f$  given by

$$f(x) = \begin{cases} \frac{1}{30} \left( \frac{8}{x^2} + 3x^2 - 14 \right) & 2 \leq x \leq 4, \\ 0 & \text{otherwise.} \end{cases}$$

- (i) Find the distribution function of  $X$ . [3]

The random variable  $Y$  is defined by  $Y = X^2$ .

- (ii) Find the probability density function of  $Y$ . [4]
- (iii) Find the value of  $y$  such that  $P(Y < y) = 0.8$ . [3]