

The continuous random variable X has probability density function given by

$$f(x) = \begin{cases} \frac{1}{20} \left(3 - \frac{1}{\sqrt{x}} \right) & 1 \leq x \leq 9, \\ 0 & \text{otherwise.} \end{cases}$$

The random variable Y is defined by $Y = \sqrt{X}$.

(i) Show that the probability density function of Y is given by

$$g(y) = \begin{cases} \frac{1}{10}(3y - 1) & 1 \leq y \leq 3, \\ 0 & \text{otherwise.} \end{cases} \quad [7]$$

(ii) Find the mean value of Y . [2]