

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

$$f(x) = \begin{cases} \frac{x}{4}(4-x^2) & 0 \leq x \leq 2, \\ 0 & \text{otherwise.} \end{cases}$$

(a) Find $\text{Var}(\sqrt{X})$. [4]

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

(b) Find the probability density function of Y . [4]

(c) Find the exact value of the median of Y . [2]