

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]