

## STEP II, 2009, Q12

12 A continuous random variable  $X$  has probability density function given by

$$f(x) = \begin{cases} 0 & \text{for } x < 0 \\ ke^{-2x^2} & \text{for } 0 \leq x < \infty, \end{cases}$$

where  $k$  is a constant.

- (i) Sketch the graph of  $f(x)$ .
- (ii) Find the value of  $k$ .
- (iii) Determine  $E(X)$  and  $\text{Var}(X)$ .
- (iv) Use statistical tables to find, to three significant figures, the median value of  $X$ .



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