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

$$\mathrm{f}(x) = \begin{cases} kx^3 & 0 \leqslant x < 1, \\ k(5-x) & 1 \leqslant x \leqslant 5, \\ 0 & \text{otherwise,} \end{cases}$$

where k is a constant.

(a) Sketch the graph of f. [1]

(b) Show that $k = \frac{4}{33}$. [2]

(c) Find the cumulative distribution function of X. [3]

(d) Find the median value of X. [4]