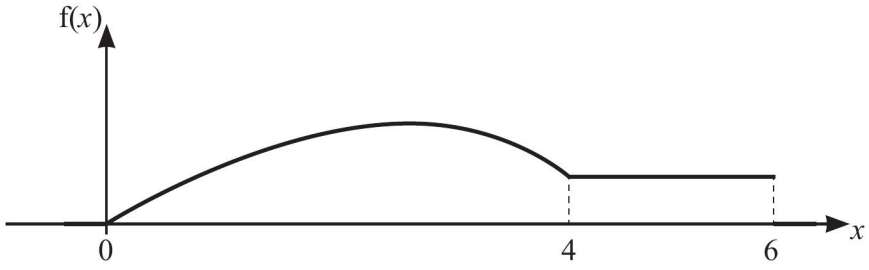

The diagram shows the continuous random variable X with probability density function f given by

$$\mathrm{f}(x) = \begin{cases} \frac{1}{128}(4ax - bx^3) & 0 \leqslant x \leqslant 4, \\ c & 4 \leqslant x \leqslant 6, \\ 0 & \text{otherwise,} \end{cases}$$

where a, b and c are constants.

The upper quartile of X is equal to 4.

(a) Show that $c = \frac{1}{8}$ and find the values of a and b. [4]

(b) Find the exact value of the median of X. [3]

(c) Find $\mathrm{E}(\sqrt{X})$, giving your answer correct to 2 decimal places. [3]