5 A random variable X has probability density function given by

$$f(x) = \begin{cases} k(2x^2 - x^3) & 0 \leqslant x \leqslant 2, \\ 0 & \text{otherwise.} \end{cases}$$

(a) Show that $k = \frac{3}{4}$. [3]

The median of X is denoted by m.

(b) **(i)** Write down the value of $P(X \leqslant m)$. [1]

(ii) Hence find $P(E(X) \leqslant X \leqslant m)$. [5]