The random variable X has probability density function f given by

$$f(x) = \begin{cases} \frac{1}{21}(x-1)^2 & 2 \leqslant x \leqslant 5, \\ 0 & \text{otherwise.} \end{cases}$$

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

The random variable Y is defined by $Y = (X-1)^4$.

(b) Find the probability density function of Y. [3]

(c) Find the median value of Y. [2]

(d) Find $E(Y)$. [2]