2. The continuous random variable X has cumulative distribution function given by

$$\mathrm{F}(x) = \begin{cases} 0 & x < 0 \\ kx^3 & 0 \leqslant x \leqslant b \\ 1 & x > b \end{cases}$$

where k and b are positive constants.

Given that $\mathrm{P}(2 < x < 8) = \frac{7}{24}$ and $b > 8$

(a) show that $k = \frac{1}{1728}$

(3)

(b) By finding the value of b, specify the probability density function, $\mathrm{f}(x)$, for all values of x

(4)

(c) Find the median of X

(2)

(d) State the mode of X

(1)

(e) State, giving a reason, the skewness of the distribution of X

(1)

(Total for Question 2 is 11 marks)