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4. The random variable T has probability density function $f(t)$ where

$$f(t) = \begin{cases} \frac{1}{3} & 1 \leqslant t < 2 \\ k(4t^2 - t^3) & 2 \leqslant t \leqslant 4 \\ 0 & \text{otherwise} \end{cases}$$

(a) Show that $k = \frac{1}{22}$

(3)

(b) Sketch the probability density function.

(2)

(c) Find the mode of T.

(3)

(d) Find the cumulative distribution function $F(t)$ for all values of t.

(5)

(e) Find the probability that T is greater than 3

(2)

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Question 4 continued

(Total 15 marks)

Q4