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4. The continuous random variable X has probability density function given by

$$f(x) = \begin{cases} \frac{1}{15}x^2(3-x) & 1 \leqslant x < 3 \\ \frac{3}{10}(x-3) & 3 \leqslant x \leqslant 5 \\ 0 & \text{otherwise} \end{cases}$$

(a) Use algebraic integration to find $E(X^2)$

(4)

(b) Define fully the cumulative distribution function $F(x)$

(5)

(c) Find $P(2 < X < 4)$

(2)

(d) Find, to 3 significant figures, the value of k such that $P(X > k) = 0.2$

(3)

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Q4