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5. The waiting time, T minutes, of a customer to be served in a local post office has probability density function

$$f(t) = \begin{cases} \frac{1}{50}(18 - 2t) & 0 \leqslant t \leqslant 3 \\ \frac{1}{20} & 3 < t \leqslant 5 \\ 0 & \text{otherwise} \end{cases}$$

Given that the mean number of minutes a customer waits to be served is 1.66

(a) use algebraic integration to find Var(T), giving your answer to 3 significant figures.

(5)

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

(4)

(c) Calculate the probability that a randomly chosen customer's waiting time will be more than 2 minutes.

(2)

(d) Calculate $P([E(T) - 2] < T < [E(T) + 2])$

(2)

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Question 5 continued

(Total 13 marks)

Q5