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Question 3 continued

Lined area for writing answers.

(Total 9 marks)

Q3



- 4.** The number of houses sold by an estate agent follows a Poisson distribution, with a mean of 2 per week.
- (a) Find the probability that in the next 4 weeks the estate agent sells,
- (i) exactly 3 houses,
 - (ii) more than 5 houses.

(5)

The estate agent monitors sales in periods of 4 weeks.

- (b) Find the probability that in the next twelve of these 4 week periods there are exactly nine periods in which more than 5 houses are sold.

(3)

The estate agent will receive a bonus if he sells more than 25 houses in the next 10 weeks.

- (c) Use a suitable approximation to estimate the probability that the estate agent receives a bonus.

(6)



5. The queueing time, X minutes, of a customer at a till of a supermarket has probability density function

$$f(x) = \begin{cases} \frac{3}{32}x(k-x) & 0 \leq x \leq k \\ 0 & \text{otherwise} \end{cases}$$

- (a) Show that the value of k is 4 **(4)**
- (b) Write down the value of $E(X)$. **(1)**
- (c) Calculate $\text{Var}(X)$. **(4)**
- (d) Find the probability that a randomly chosen customer's queueing time will differ from the mean by at least half a minute. **(3)**



Question 5 continued

Lined writing area for question response.

Q5

(Total 12 marks)



7. The continuous random variable X has probability density function $f(x)$ given by

$$f(x) = \begin{cases} \frac{x^2}{45} & 0 \leq x \leq 3 \\ \frac{1}{5} & 3 < x < 4 \\ \frac{1}{3} - \frac{x}{30} & 4 \leq x \leq 10 \\ 0 & \text{otherwise} \end{cases}$$

(a) Sketch $f(x)$ for $0 \leq x \leq 10$

(4)

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

(8)

(c) Find $P(X \leq 8)$.

(2)



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Question 7 continued

Lined area for writing the answer to Question 7, consisting of 30 horizontal lines.

Q7

(Total 14 marks)



8. In a large restaurant an average of 3 out of every 5 customers ask for water with their meal.

A random sample of 10 customers is selected.

(a) Find the probability that

- (i) exactly 6 ask for water with their meal,
- (ii) less than 9 ask for water with their meal.

(5)

A second random sample of 50 customers is selected.

(b) Find the smallest value of n such that

$$P(X < n) \geq 0.9$$

where the random variable X represents the number of these customers who ask for water.

(3)



