

3. The probability of a telesales representative making a sale on a customer call is 0.15

Find the probability that

(a) no sales are made in 10 calls, **(2)**

(b) more than 3 sales are made in 20 calls. **(2)**

Representatives are required to achieve a mean of at least 5 sales each day.

(c) Find the least number of calls each day a representative should make to achieve this requirement. **(2)**

(d) Calculate the least number of calls that need to be made by a representative for the probability of at least 1 sale to exceed 0.95 **(3)**



4. A website receives hits at a rate of 300 per hour.
(a) State a distribution that is suitable to model the number of hits obtained during a 1 minute interval. (1)

(b) State two reasons for your answer to part (a). (2)

Find the probability of

(c) 10 hits in a given minute, (3)

(d) at least 15 hits in 2 minutes. (3)

The website will go down if there are more than 70 hits in 10 minutes.

(e) Using a suitable approximation, find the probability that the website will go down in a particular 10 minute interval. (7)



Question 5 continued

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Q5

(Total 7 marks)



6. A random variable X has probability density function given by

$$f(x) = \begin{cases} \frac{1}{2} & 0 \leq x < 1 \\ x - \frac{1}{2} & 1 \leq x \leq k \\ 0 & \text{otherwise} \end{cases}$$

where k is a positive constant.

- (a) Sketch the graph of $f(x)$. (2)

- (b) Show that $k = \frac{1}{2}(1 + \sqrt{5})$. (4)

- (c) Define fully the cumulative distribution function $F(x)$. (6)

- (d) Find $P(0.5 < X < 1.5)$. (2)

- (e) Write down the median of X and the mode of X . (2)

- (f) Describe the skewness of the distribution of X . Give a reason for your answer. (2)



7. (a) Explain briefly what you understand by

- (i) a critical region of a test statistic,
- (ii) the level of significance of a hypothesis test.

(2)

(b) An estate agent has been selling houses at a rate of 8 per month. She believes that the rate of sales will decrease in the next month.

- (i) Using a 5% level of significance, find the critical region for a one tailed test of the hypothesis that the rate of sales will decrease from 8 per month.
- (ii) Write down the actual significance level of the test in part (b)(i).

(3)

The estate agent is surprised to find that she actually sold 13 houses in the next month. She now claims that this is evidence of an increase in the rate of sales per month.

(c) Test the estate agent's claim at the 5% level of significance. State your hypotheses clearly.

(5)



