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6. (i) (a) State the conditions under which the Poisson distribution may be used as an approximation to the binomial distribution.

(1)

A factory produces tyres for bicycles and 0.25% of the tyres produced are defective.

A company orders 3000 tyres from the factory.

(b) Find, using a Poisson approximation, the probability that there are more than 7 defective tyres in the company's order.

(3)

(ii) At the company 40% of employees are known to cycle to work. A random sample of 150 employees is taken. The random variable C represents the number of employees in the sample who cycle to work.

(a) Describe a suitable sampling frame that can be used to take this sample.

(1)

(b) Explain what you understand by the sampling distribution of C

(1)

Louis uses a normal approximation to calculate the probability that at most α employees in the sample cycle to work. He forgets to use a continuity correction and obtains the incorrect probability 0.0668

Find, showing all stages of your working,

(c) the value of α

(4)

(d) the correct probability.

(2)

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Question 6 continued

(Total 12 marks)

Q6