5 A receptionist receives incoming telephone calls and should connect them to the appropriate department. The probability of them being connected to the wrong department on the first attempt is 0.05

A random sample of 8 calls is taken.

(a) Find the probability that at least 2 of these calls are connected to the wrong department on the first attempt.

(3)

The receptionist receives 1000 calls each day.

(b) Use a Poisson approximation to find the probability that exactly 45 callers are connected to the wrong department on the first attempt in a day.

(3)

The total time, T seconds, taken for a call to be answered by a department has a continuous uniform distribution over the interval [10, 50]

(c) Find $P(T > 16)$

(2)

The number of calls the receptionist receives in a one-minute interval is modelled by a Poisson distribution with mean 6
The receptionist receives a call from Jia and tries to connect it to the right department.

(d) Find the probability that in the next 40 seconds Jia's call is answered by the right department on the first attempt and the receptionist has received no other calls.

(4)

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Question 5 continued

(Total for Question 5 is 12 marks)