Stat 134: Section 11

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Problem 1

Suppose calls are arriving at a telephone exchange at an average rate of one per second, according to a Poisson arrival process. Find:

a. the probability that the fourth call after time $t = 0$ arrives within 2 seconds of the third call;

b. the probability that the fourth call arrives by time $t = 5$ seconds;

c. the expected time at which the fourth call arrives.

Ex 4.2.5 in Pitman's Probability

Problem 2

A Geiger counter is recording background radiation at an average rate of one hit per minute. Let T_3 be the time in minutes when the third hit occurs after the counter is switched on. Find $P(2 \leq T_3 \leq 4)$.
Ex 4.2.6 in Pitman's Probability

Problem 3

Local calls are coming into a telephone exchange according to a Poisson process with rate λ_{loc} calls per minute. Independently of this, long-distance calls are coming in at a rate of λ_{dis} calls per minute. Write down expressions for probabilities of the following events:

a. exactly 5 local calls and 3 long-distance calls come in a given minute;

b. exactly 50 calls (counting both local and long distance) come in a given three- minute period;

c. starting from a fixed time, the first ten calls to arrive are local.

Ex 4.rev.13 in Pitman's Probability

Problem 4

Cars arrive at a toll booth according to a Poisson process at a rate of 3 arrivals per minute.

a. What is the probability that the third car arrives within three minutes of the first car?

b. Of the cars arriving at the booth, it is known that over the long run 60% are Japanese imports. What is the probability that in a given ten-minute interval, 15 cars arrive at the booth, and 10 of these are Japanese imports? State your assumptions clearly.

Ex 4.rev.16 in Pitman's Probability