Stat 134: Poisson Process Review

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Some Things to Remember

Given a Poisson Process with rate λ:

a. P(arrival in interval δt) =

b. The distribution of the waiting time between any 2 consecutive arrivals is:

c. The distribution of T_r, the waiting time until the rth arrival is:

d. Are the following independent?

   1. The events of arrivals in disjoint intervals
   2. The distributions of the waiting times between arrivals

Problem 1

Consider two independent Poisson processes with rates λ_1 and λ_2. Those processes measure the number of customers arriving in store 1 and 2.

a. What is the probability that a customer arrives in store 1 before any arrives in store 2?

b. What is the probability that in the first hour exactly 6 customers arrive at the two stores? (The total for both is 6.)

c. Given exactly 6 have arrived at the two stores, what is the probability all 6 went to store 1?

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Problem 2

Bus lines A, B and C service a particular stop. Suppose the lines come as independent Poisson processes with rates λ_A, λ_B, and λ_C per hour respectively. Find expressions for the following probabilities.

a. Exactly one A bus, two B buses, and one C bus come to the stop in a given hour.

b. A total of 7 buses come to the stop in a given two hour time period.

c. Starting from a fixed time, the first A bus arrives after t hours.

Ex 4.rev.18 in Pitman's Probability

Problem 3

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