Chapter 4 Review Session

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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. The number of arrivals in an interval of length t is:

e. The CDF of the waiting time until the rth arrival is:

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?

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

Problem 2

Let T $\sim$ exp(λ), Y = $\sqrt{T}$

a. Find the density of Y, using the CDF of Y.

b. Identify the distribution Y for λ=1/2

Problem 3

We will show that the minimum of exponentials is exponetially distributed, using multiple approaches. Let Z = min(X, Y), where X, Y $\sim$ exp(λ)

a. Find the density of Z, using the CDF of Z

b. Find the density of Z directly from P(Z $\in$ dz)

c. Generalize to find the distribution of the minimum of n exponentials