Math 339SP, Spring 2022 — Poisson process

Class on March 22

The following problems are meant to get us comfortable with the basics of Poisson processes.

Problem 1. Let (N_t) be a Poisson process with rate $\lambda = 1.5$. Compute the following probabilities, which are meant to get you familiar with notation and the notions of stationary, independent increments. If the process represents the arrival of emails, with time units of hours, what is the practical meaning of each event described?

1. $P(N_{2.5} = 2, N_5 = 4)$

2. $P(N_5 = 7 \mid N_2 = 3)$

3. $P(N_1 = 2 \mid N_4 = 6)$

Problem 2. Calls are received at a company call center according to a Poisson process at the rate of five calls per minute. Express the following events in terms of Poisson process N_t notation and then find the probability of the event.

1. No call occurs over a 2 minute period.

2. Two calls occur in the first minute, and 5 calls occur in the following two minutes.

3. Twenty calls are received in the first three minutes and 6 of those calls occur in the first minute.