IEOR 6711: Stochastic Models I

Fall 2003, Professor Whitt

Homework Assignment 3: Tuesday, September 16, 2003

The Poisson Process

Due before class at 10:00am on Tuesday, September 23.

Problems from Chapter 2 of *Stochastic Processes*, second edition, by Sheldon Ross. In all homework and exams, show your work. There are a lot of problems here. It thus would be good to spread it out.

You only need turn in the problems without answers in the back of the book.

Problem 2.1 (in Ross) (Hint: $e^t = \sum_{j=0}^{\infty} \frac{t^j}{j!}$ and $e^t = \sum_{j=0}^{k} \frac{t^j}{j!} + o(t^k)$ by Taylor’s theorem.)

Problem 2.3

Problem 2.4

Problem 2.5

Problem 2.6 (Hint: The times between successive part failures while the machine is working are IID exponential random variables with mean $1/(\mu_1 + \mu_2)$. The identities of the successive parts that fail are IID Bernoulli random variables with the probability part 1 fails being $p_1 = \mu_1 / (\mu_1 + \mu_2)$, which are independent of the failure times; see Problem 1 in the topics for discussion, Tuesday, September 9.)

Problem 2.7

Problem 2.8

Problem 2.9

Problem 2.10

Problem 2.11

Problem 2.13 (Hint: For an easy proof, apply Proposition 2.3.2 in the special case $P(s) = p$ for all $s$.)

Problem 2.14

Problem 2.16

Problem 2.17

Problem 2.18

Problem 2.26