ECE Communication Networks 1
Homework Assignment 3
Fall 2006

Overview

Problems

1. **The $M/E_k/1$ queue:** Consider a queue with a Poisson arrival process, but where the service times are k-stage Erlangian. Here, the pdf for the service times are given by

$$f_X(x) = \frac{k\mu(k\mu x)^{k-1}}{(k-1)!}e^{-k\mu x}.$$

The Laplace transform of the density is given by

$$\hat{f}_X(s) = \left(1 + \frac{s}{k\mu}\right)^{-k}.$$

(You don't have to show the Laplace transform). Find the probability distribution $\{p_n\}$ for the amount of customers in the system.

2. **Alternate Derivation of Pollaczek-Khinchine:** Use the probability generating function expression for $P(z)$.

3. Bertsekas and Gallager, Problem 3.40

4. Bertsekas and Gallager, Problem 3.47