

Homework 11
November 12, 2013

1. Suppose there are two tellers taking customers in a bank. Service times at a teller are independent, exponentially distributed random variables, but the first teller has a mean service time of 2 minutes while the second teller has a mean of 5 minutes. There is a single queue for customers awaiting service. Suppose at noon, 3 customers enter the system. Customer A goes to the first teller, B to the second teller, and C queues. To standardize the answers, let us assume that T_A is the length of time in minutes starting from noon until Customer A departs, and similarly define T_B and T_C .
 - (a) What is the probability that Customer A will still be in service at time 12:05?
 - (b) What is the expected length of time that A is in the system?
 - (c) What is the expected length of time that A is in the system if A is still in the system at 12:05?
 - (d) How likely is A to finish before B?
 - (e) What is the mean time from noon until a customer leaves the bank?
 - (f) What is the average time until C starts serv
 - (g) What is the average time that C is in the system?
 - (h) What is the average time until the system is empty?
 - (i) What is the probability that C leaves before A given that B leaves before A?
 - (j) What are the probabilities that A leaves last, B leaves last, and C leaves last?
 - (k) Suppose D enters the system at 12:10 and A, B, and C are still there. Let W_D be the time that D spends in the system. What is the mean time that D is in the system?