Name:

SA402 – Dynamic and Stochastic Models
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Fall 2016

Quiz – 31 August 2016

Instructions. You have 15 minutes to complete this quiz. You may use your calculator. You may not use any other materials (e.g., notes, homework, books).

Standard	Problems	Score
A1	1ab	
B1	2ab	
B2	2c	

Problem 1. Think back to the Darker Image copy shop in Lesson 1 and the accompanying homework. Suppose you went back to the shop and recorded the following interarrival and service times for the first 4 customers:

customer	interarrival time	service time
1	10	7
2	1	5
3	2	6
4	4	2

Recall that the proposed "full-service system" adds a second full-service copier with 1 queue for both copiers, and service is delivered first-come-first-served by the next available copier.

a. Simulate the proposed full-service system for the first 4 customers below, starting at time 0.

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

Current time:

Full Service 1   Full Service 2

Queue

Next system event	Time
customer arrival	
full service 1 finish	
full service 2 finish	

b. What is the average delay experienced by the first 4 customers?

Problem 2. A random variable X has the following density function:

$$f_X(a) = \begin{cases} 0 & \text{if } a < 0, \\ \frac{1}{9}a^2 & \text{if } 0 \le a \le 3, \\ 0 & \text{if } a > 3. \end{cases}$$

a. What is the probability that $1 < X \le 2$?

b. What is the expected value of X?

Another random variable Y has the following cdf:

$$F_Y(a) = \begin{cases} 0 & \text{if } a < 1, \\ 1/3 & \text{if } 1 \le a < 2, \\ 2/3 & \text{if } 2 \le a < 4, \\ 1 & \text{if } a \ge 4. \end{cases}$$

c. What values does Y take? Is Y discrete or continuous? Briefly explain why.