BUAD 311 - Exam 1-Solutions – Spring 2015

Section A: Multiple Choice [21 points; 3 points each; no partial credit; circle the correct answer]

1. Trojans Cafe employs one worker to make both sandwiches and nachos. On average, a sandwich takes 5 minutes to make and nachos takes 7 minutes to make. The percentage of customers that order sandwiches is 25% and the percentage of customers that order nachos is 75%. What is the capacity of Trojans Cafe, in customers per hour, rounded to the nearest integer?

   a. 12
   b. 6
   c. 9
   d. None of the above

   c) The average processing time is: 5*0.25 + 7*0.75 = 6.50
   The capacity is: 60/6.50 = 9.23 customers per hour.

2. At Trojans Cafe, your data shows that customer arrive to the store following a Poisson distribution, and that the time to see each customer is either 5 minutes or 10 minutes. How would you classify this queue?

   a. M/D/1
   b. M/M/1
   c. G/M/1
   d. M/G/1

   d)

3. In the Goal, which of the following statements was noted as being true?
   a. Bottleneck analysis is only useful in systems with no variability.
   b. Customers will not wait if utilization is less than one.
   c. It is possible that adding capacity to a non-bottleneck resource will increase throughput.
   d. None of the above are true.

   d)

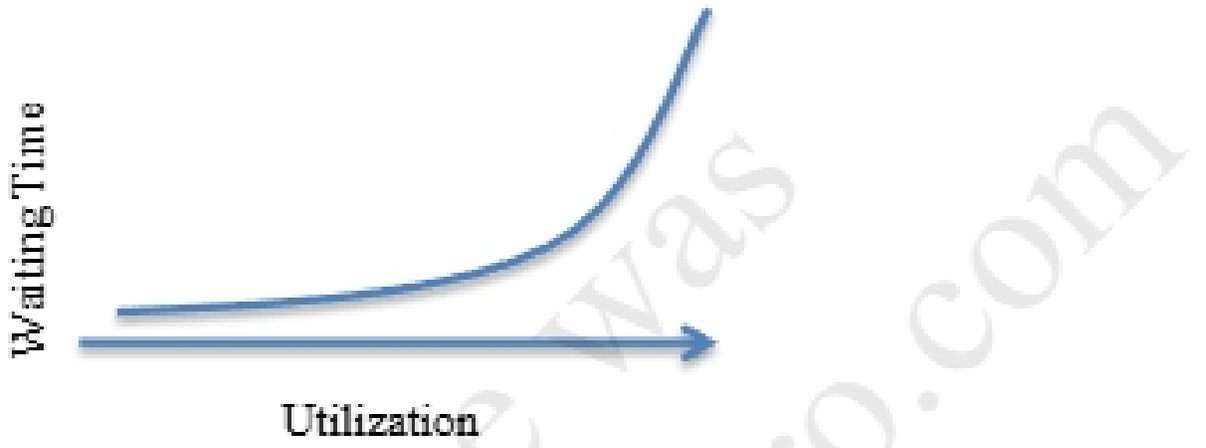
4. Which of the following statements is TRUE about the Saintemarie Hospital case?
   a. It is very clear that physicians are the constraining resource and hence are the "servers" in the context of a queuing model
   b. It is very evident that the period of analysis should be the full day as it captures the variability in the system.
   c. The most appropriate queuing model to use is the D/D/m model.
   d. In order to reduce waiting time, it is necessary to hire more Nurses.
   e. None of the above.

   e)

5. Your company's salad bar's wait time has reduced by 3 minutes and is now 15 minutes after a new server was hired a month ago. You convince the management to hire another server at the salad bar. Which of the following could plausibly be the new waiting time in the initial line?

a) 10 minutes
b) 12 minutes
c) 13 minutes
d) 15 minutes

c) You're decreasing the utilization by a percentage less than what you reduced it before, and the smaller utilization, the smaller effect it has on waiting time.



6. Trojans Restaurant has observed that there is a queue which forms at certain periods of the day. The restaurant management is considering reducing service time, but first wants to calculate how much time (on average) restaurant patrons spend in the restaurant. On average, 15 patrons enter the restaurant every hour, and there are usually an average of 8 people in the restaurant at a given point.
   a. 24 minutes
   b. 45 minutes
   c. 12 minutes
   d. 32 minutes

d) Littles Law…. 8/15 = .5333 * 60 = 32 minutes

7. Which of the following statements about the article "The Psychology of Waiting Lines (by David Maister)" is FALSE?

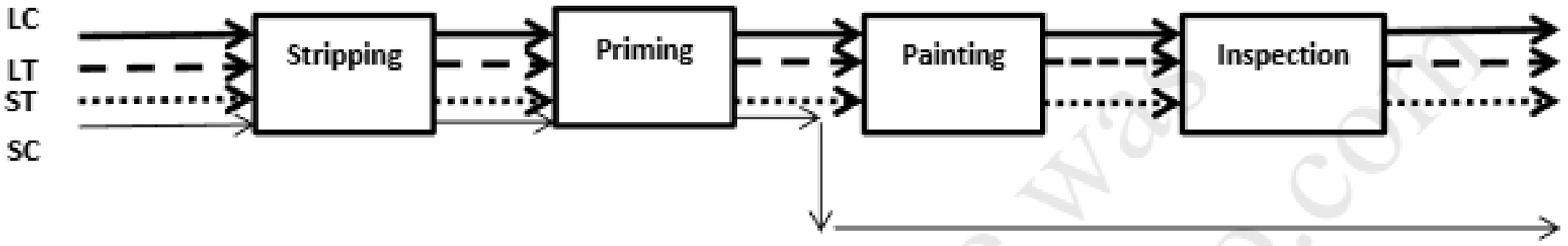
   a. Occupied waits feel longer than unoccupied waits
   b. Uncertain waits feel longer than known and finite waits
   c. Customers tend to tolerate longer waits for service perceived as more valuable
   d. When a customer has a negative experience in the early stages of service, even when the rest of his encounter is smooth, he could remain unhappy
   e. None of the above

a)

Section B: Problems

Problem 1 [28 points]

Trojan ReLifers refinishes old wood furniture. They make 4 products. These are: LC (large chairs), SC (small chairs), LT (large tables) and ST (small tables). Their process has 4 steps: Stripping, Priming, Painting, and Inspection; a process flow diagram provided below describes the flow of the four products. Except for SC (small chairs), all other products are sold as fully finished. SC's are sold semi-finished as there is a lucrative market for such a product. In each of workstations, each worker works independently on his/her own chair. Processing times/unit (in hours) at each workstation are given in the table below.



		Workstation			
		Stripping (hours/unit)	**Priming** (hours/unit)	**Painting** (hours/unit)	**Inspection** (hours/unit)
Product	**LC**	2.5	1.5	1.75	0.8
	LT	3.5	2.75	3	1.5
	ST	2	1.2	1.6	0.75
	SC	1.4	1.0		

Currently, the factory is organized by process, i.e., organized by the type of processing--Stripping, Priming, Painting, and Inspection.

a) (13 points) Suppose Trojan ReLifers processes all the 4 products. Tubby Trojan, the CEO, plans to allocate 7 workers to the Stripping, 6 workers to the Priming, 6 workers to the Painting and 4 workers to Inspection. The weekly demands for LC, LT, ST, and SC are 45, 30, 30, and 45 units respectively. Which station is the bottleneck? What is the capacity of Trojan ReLifers in "average" units per week?

METHOD 1

Implied Utilization = Time used/time available

For example, utilization of Stripping w-s=(45*2.5 hrs+30*3.5 hrs+30*2 hrs + 45*1.4 hrs)/(40 hrs/week*7 workers)=340/280=1.216

Time used	340.5	231	216.75	103.5