

Computer Engineering Department
King Fahd University of Petroleum and
Minerals

COE 402: Computer Systems Performance
Evaluation

Second Major Exam

Date: May 19th, 2007

Time: 8:00PM – 10:00PM

Instructor: Dr. Uthman Baroudi

Student Name:-----

Student ID:-----

	Max	Earned
Question 1	40	
Question 2	60	
Total	100	

Notes:

Be a smart exam taker:

If you get stuck on one problem go on to another problem.

Don't waste your time giving irrelevant (or not requested) details.

Go over all questions and start with what you know first.

Read, think, state all your assumptions, and then answer.

Question # 1 (20 marks)

- 1) (10 points) Provide a one-sentence definition of following terms using provided space in the following table.

Term	Explanation
Paired observations	
Continuous state model	
Discrete time model	
Monte Carlo simulation	
Trace driven simulation	

- 2) (12 points each) During our lectures we have discussed several common mistakes in simulation. One of them is “invalid models”.
- What does it mean?
 - Explain briefly how you can avoid this mistake by showing what to validate and how.

- 3) (*3 points each*) Consider the problem of simulating single server queue with **limited buffer**, how would you compute the following performance measures:
- a. Mean service time

 - b. Mean system utilization

 - c. Mean queue length

 - d. Mean blocked jobs
- 4) (*2 points each*) Justify the following statements
- a. The confidence level should NOT always be high;

 - b. A fully validated model is a myth!

 - c. The confidence interval is inversely proportional to the total number of observations.

Question # 2 (60 marks)

- 1) Briefly describe what the Central Limit Theorem is.
- 2) Show how the above theorem can help in determining the confidence interval.
- 3) Suppose that you want to estimate the mean performance of a system with an accuracy of $\pm r$ %. Can the confidence level help in determining the sample size? If yes, show how?
- 4) A single experiment was repeated on two scheduling algorithms (A&B) 50 times. Scheduler A was found to be superior to scheduler B in 32 repetitions. Can we state with 99% confidence that scheduler A is superior?

