CIS 752: Simulation

Raj Jain

Raj Jain is now at
Washington University in Saint Louis
Jain@cse.wustl.edu
http://www.cse.wustl.edu/~jain/

- What you should already know?
- What you will learn?
- How you will be graded?

Text Book: Raj Jain, "The Art of Computer Systems Performance Analysis," Wiley, 1991, 4th+ printing. Earlier printings have typos.

Grading

- Class Participation 10%
- Homeworks 30%
- Quizes 60%
  n out-of n+1 quizes
- Grades: A through F

Office Hours

- Tu-Th 12:30-1:00PM, Dreese 297

Frequently Asked Questions

- Yes, I do use "curve". Your grade depends upon the performance of the rest of the class.
- All homeworks are due at the beginning of the next class (not next week).
- All late submissions must be preapproved.
- All quizzes are open-book and extremely time limited.
- Quizzes consist of numerical as well as multiple-choice (true-false) questions.
- There is negative grading on incorrect multiple-choice questions. Grade: +1 for correct. -1/(n-1) for incorrect.
- Everyone including the graduating seniors are graded the same way.

Prerequisite

- Statistics:
  - Mean, variance
  - Normal distribution
  - Density function, Distribution function
  - Coefficient of variation
    Correlation coefficient
  - Median, mode, Quantile
- C Programming, UNIX

Additional Requisites

- Common mistakes and how to avoid them (Chapter 2)
- Selection of techniques and metrics (Chapter 3)
- The art of data presentation (Chapter 10)
- Summarizing measured data (Chapter 12)

Topics

- Comparing systems using random data
- Single queue
- Introduction to simulation
  - Selection of language
- Analysis of simulation results
  - Validation + Verification
  - Stopping criterion
- Experimental design
- Random number generation
- Testing random number generators
- Random variate generation
- Applying techniques taught in the class using CSIM

Tentative Schedule

- 9/25/97 Introduction to the course
- 9/30/97 24. Introduction to Simulation
- 10/2/97 13. Comparing systems using random data
- 10/7/97* 30. Single Queues
- 10/9/97 33. Operational Laws
- 10/14/97 Quiz 1
- 10/16/97 25. Analysis of Simulation Results
- 10/21/97 25. Analysis (Continued)
- 10/23/97 26. Random Number Generation
- 10/28/97 27. Testing Random Numbers
- 10/30/97 Quiz 2

Schedule (Cont.)

- 11/4/97 28. Random Variate Generation
- 11/6/97 29. Commonly Used Distributions
- 11/11/97 Veteran's Day Holiday
- 11/13/97 16+17. Experimental Design
- 11/18/97 19. 2^{k-p} Fractional Factorial Designs
- 11/20/97 Quiz 3
- 11/25/97 Last Class
- 11/27/97 Thanksgiving Holiday

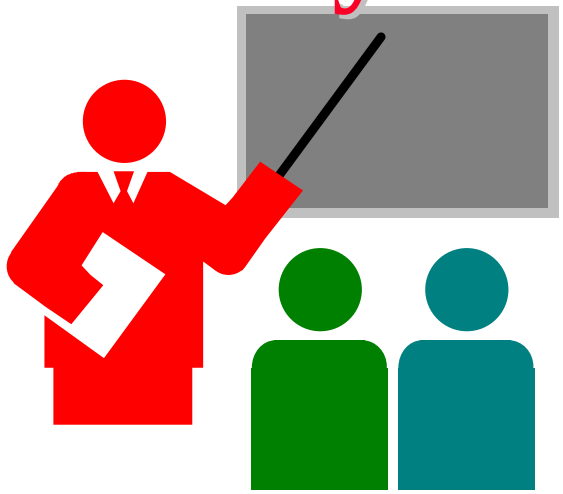
* Class conducted by the assistant

? There may or may not be a class. To be announced.

Why You Shouldn't Take This Course?

- You aren't ready for the hardwork
- You don't have 15 hours/week
- You don't have the background
- You just want to sit and listen
- You are not ready to take the initiative
  Only key concepts will be covered in the class.
  Students are expected to read the rest from the book.
- This does not cover what you want

Summary



- It is going to be a time consuming course
- You will learn a lot
- Grading: Tough

Quiz 0: Prerequisites

True or False?

T F

❑ ❑ The sum of two normal variates is normal.

❑ ❑ The sum of two normal variates with means 4 and 3 has a mean of 12.

❑ ❑ The probability of a fair coin coming up head once and tail once in two throws is 1.

❑ ❑ The density function f(x) approaches 1 as x approaches ∞.

❑ ❑ Given two variables, the variable with higher median also has a higher mean.

❑ ❑ The probability of a fair coin coming up heads twice in a row is 1/4.

❑ ❑ The difference of two normal variates with means 4 and 3 has a mean of 4/3.

❑ ❑ The cumulative distribution function F(x) approaches 1 as x approaches ∞.

❑ ❑ High coefficient of variation implies a low variance and vice versa.

❑ ❑ If x is 0, then after x++, x will be 1.

Marks = Correct Answers _____ - Incorrect Answers _____ = _____

Homework #1

- Read chapters 2, 3
- Submit answers to
  - Exercise 2.2 assuming the system is a personal computer
  - Exercise 3.1
- Due: Tuesday, September 30, 1997

Homework #2

- Read Chapters 10 and 12
- Submit answers to
  - Exercise 10.1
  - Exercise 12.1
- Due: Thursday, Oct 2, 1997