Final Examination : Semester 2

Date : February 23, 2010

Subject : 225-510 Computer Simulation

Academic Year : 2009

Time : 09:00 – 12:00

Room : 5203

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ทุจริตในการสอบโทษขั้นต่ำ คือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียน *1* ภาคการศึกษา

INSTRUCTIONS:

1. *There are 7 questions in this examination paper. The marks allocated to individual questions are stated before each question.*
2. *Answer all questions in the answer book(s) provided.*
3. *Begin the answer to each question on a new page.*
4. *Books, dictionaries and calculators are allowed.*

Asst. Prof. S. Taungbodhitham

Instructor

1. (5 Marks) Describe the steps in a simulation study.

2. (5 Marks) A baker is trying to figure out how many dozens of bagels to bake each day. The probability distribution of the number of bagel customers is as follows:

Number of customers/day	8	10	12	14
Probability	0.35	0.30	0.25	0.10

Customers order 1, 2, 3, or 4 dozen bagels according to the following probability distribution.

Number of dozen ordered/customer	1	2	3	4
Probability	0.4	0.3	0.2	0.1

Bagels sell for $8.40 per dozen. They cost $5.80 per dozen to make. All bagels not sold at the end of the day are sold at half-price to a local grocery store. Based on five days of simulation, construct a simulation table for baking of 4 dozen bagels each day and estimate the average daily profit.

3. (5 Marks) Time to failure for an automated production process have been found to be randomly distributed with an *Exponential* distribution with parameters $\lambda = 18$ occurrences per minute. Generate five values of time to failure from this distribution using the following uniform random numbers:

$$.17 \quad .19 \quad .07 \quad .55 \quad .22$$

4. (5 Marks) Use the multiplicative congruential method to generate a sequence of four three-digit random integers. Let $X_0 = 117$, $a = 43$, and $m = 1000$.

5. (5 Marks) A simulation model of *PSU IE job shop* was developed to investigate the different scheduling rules. To validate the model,

the current used scheduling rule was incorporated into the model and the resulting output compared to the observed system behavior. By searching the previous year's computerized records, it was estimated that the average number of jobs in the shop was 22.5 on a given day. Seven independent replications of the model were run, each of 30 days duration, with the following results for average number of jobs in the shop:

20.2   21.9 19.8 22.1 19.4 22.0 18.9

Conduct a statistical test to determine if model output is consistent with system behavior. Use a level of significance of $\alpha = 0.10$.

6. (5 Marks) Records pertaining to the monthly number of job-related injuries at an underground coalmine were being studied by a federal agency. The values for the past 100 months were as follows:

Injuries per Month x	Observed Frequency O_i
0	35
1	40
2	13
3	6
4	4
5	1
6	1

Apply the chi-square test to this data to test the hypothesis that the underlying distribution is Poisson. Use the level of significance $\alpha = 0.025$.

7. (5 Marks) In Example 11.7, on page 387 of your text book, suppose that management desired 90% confidence in the estimate of mean system time w and that the error allowed was $\varepsilon = 0.5$ minute. Using the same initial sample of size $R_0 = 4$ (given in Table 11.1), figure out the total sample size.

END OF QUESTION
-GOOD LUCK-