NEPAL COLLEGE OF INFORMATION TECHNOLOGY

Course: Simulation and Modeling

1. Why simulation is essential in depicting real world problem. Differentiate deterministic and stochastic system.

2. Why Monte-Carlo method is best method for computing static model? Use Monte Carlo Method to determine the value of pi.

3. How nonlinear differential equation can be used to represent continuous system? Explain with

4. What are the various performance measure that measures the performance of queue? Explain in detail.

5. Why analog method does not suit for continuous system? Write the structure of CSMP code.

6. "Call does not get lost when line is busy but it creates a list and gets connected automatically when line is free." Verify this statement on the basis of various states involved in this simulation.

7. What is simulation programming task? Explain in detail.

8. Use linear congruential generator to generate random numbers for a=5 and c=3 for 4 bit computer starting with any initial seed value in between 0 to m-1.

9. When data are auto-correlated which output analysis method is used? Explain it with reference of SSQM.

10. When Simulation run is repeated for multiple times which output analysis method is preferable, explain in detail.

11. What is DSSLs? Write the GPSS code for manufacturing shop model when the parts rejected are sent back for further work. Reworking takes 15+-3 minutes. After correction the parts resubmitted for inspection. Simulated for 1000 parts to be completed.

12. Why Monte-Carlo method is best method for computing static model? Solve

$$I = \int_2^5 x^2/3 \, dx$$

13. Use Runs up and runs down test to determine the following sequence of number can be accepted or rejected on hypothesis of independence where α=0.05.

0.34	0.90	0.25	0.89	0.87	0.44	0.12	0.21	0.46	0.67
0.83	0.76	0.79	0.64	0.70	0.81	0.94	0.74	0.22	0.74
0.96	0.99	0.77	0.67	0.56	0.41	0.52	0.73	0.99	0.02
0.47	0.30	0.17	0.82	0.56	0.05	0.45	0.31	0.78	0.05
0.79	0.71	0.23	0.19	0.82	0.93	0.65	0.37	0.39	0.42
0.99	0.17	0.99	0.46	0.05	0.66	0.10	0.42	0.18	0.49

14. Test if the 5^{th} , 10^{th} , 15^{th} and so on, numbers in the sequence are autcorrelated.(Use α=0.05)

0.12	0.01	0.23	0.28	0.89	0.31	0.64	0.28	0.83	0.93

0.99	0.15	0.33	0.35	0.91	0.41	0.60	0.27	0.75	0.88
0.68	0.49	0.05	0.43	0.95	0.58	0.19	0.36	0.69	0.87

15. Develop the poker test for

a) Four-digit numbers

b) Five digits number

16. Use the mixed congruential method to generate a sequence of three two digit number with a=7, c=29, m=100 and X_0=37.

17. Use Runs above and runs below mean test to determine the following sequence of number can be accepted or rejected on hypothesis of independence where α=0.05.

0.23	0.87	0.13	0.89	0.77	0.44	0.12	0.21	0.46	0.67
0.93	0.76	0.79	0.64	0.59	0.81	0.94	0.74	0.22	0.74
0.76	0.99	0.77	0.67	0.98	0.41	0.52	0.73	0.58	0.02
0.34	0.30	0.17	0.82	0.66	0.05	0.45	0.31	0.78	0.05
0.88	0.71	0.23	0.19	0.82	0.93	0.65	0.17	0.39	0.22
0.69	0.01	0.94	0.46	0.05	0.66	0.10	0.05	0.18	0.89

18. Consider the following sequence of 120 digits:

1	3	7	4	8	6	2	5	1	6	4	4	3	3	4	2	1	5	8	7
0	7	6	2	6	0	5	7	8	0	1	1	2	6	7	6	3	7	5	9
0	8	8	2	6	7	8	1	3	5	3	8	4	0	9	0	3	0	9	2
2	3	6	5	6	0	0	1	3	4	4	6	9	9	8	5	6	0	1	7
5	6	7	9	4	9	3	1	8	3	3	6	6	7	8	2	3	5	9	6
6	7	0	3	1	0	2	4	2	0	6	4	0	3	9	3	6	8	1	5

Test whether these digits can be assumed to be independent based on frequency with which gap occur.

Use α=0.05

19.

Parts are being made at the rate of one every 6 minutes. They are of two types, *A* and *B*, and are mixed randomly, with about 10% being type *B*. A separate inspector is assigned to examine each type of part. The inspection of *A* parts takes 4 ± 2 minutes and *B* parts take 20 ± 10 minutes. Both inspectors reject about 10% of the parts they inspect. Simulate for a total of 1,000 type *A* parts accepted.

20.

Workers come to a supply store at the rate of one every 5 ± 2 minutes. Their requisitions are processed by one of two clerks who take 8 ± 4 minutes for each requisition. The requisitions are then passed to a single storekeeper who fills them one at a time, taking 4 ± 3 minutes for each request. Simulate the queue of workers and measure the distribution of time taken for 1,000 requisitions to be filled.