

Simulation
 3-rd and 4-th Year Undergraduate
 Mid-Term Examination
 2004-12-13 time: 90 minutes (score: each 10)

University of the Ryukyus
 Faculty of Engineering
 Department of Information Eng.
 Prof. Mohammad Reza Asharif

1- In a post-office with single-server:

What are events?

What are state variables?

2- Define the Monte Carlo simulation.

3- In the pilot training system, what is iconic model?

4-Find the value of the following integral by using Monte-Carlo method and compare with the true value of the integral (use 11 points as shown in the table).

$$I \int_1^2 \log_{10}(x) dx$$

<i>i</i>	1	2	3	4	5	6	7	8	9	10	
<i>x_i</i>	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2
<i>g(x)=Log₁₀(x)</i>	0.0	0.04	0.08	0.11	0.15	0.18	0.20	0.23	0.26	0.29	0.3

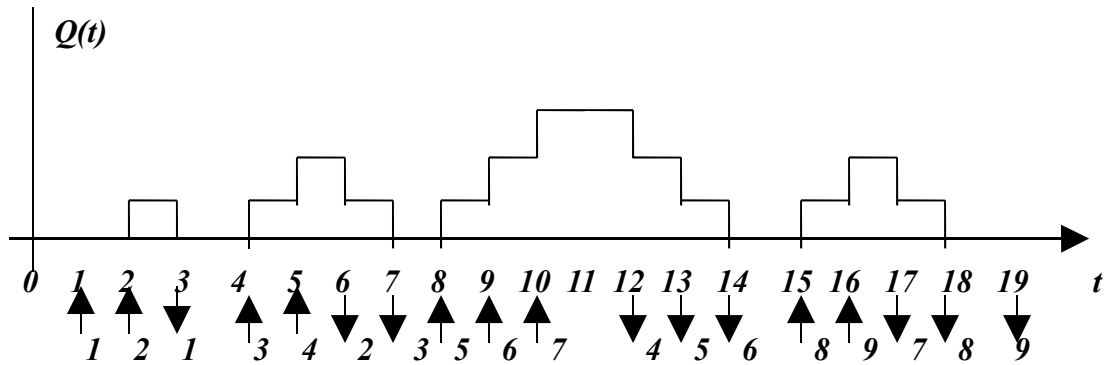
use the following calculations:

$\log_{10}(e)=0.4343$, $\log_e(10)=2.3026$, $\log_e(2)=0.6931$

5- In the following single server queuing system, find:

- a) Average delay in queue.
- b) Average number of customers in the queue.
- c) Efficiency of utilization of the server.

(i means ith arrival) (n=9) (i means ith departure)



6- In M/M/1 queue, what kind of p.d.f, the random variables in simulation, should have?

7- In coffee cooling problem, if we assume that the rate of change (decreasing) of the temperature (T) of the coffee is proportional to the temperature difference, T-Ts (Ts is the air temperature), formulate this problem by a differential equation.

8 – Explain about kind of problems that exist with simulation method?

9-Explain about two simulation approaches