Simulation **University of the Ryukyus**
3-rd and 4-th Year Undergraduate **Faculty of Engineering**
Mid-Term Examination **Department of Information Eng.**
2009-12-7 time: 90 minutes (score: each 10) **Prof. Mohammad Reza Asharif**

1-What kind of problems are with simulation?

2-What are the events in M/M/1 queue.

3 What is the Monte Carlo simulation.

4- In a Bank, what is state of the system?

5- Classify simulation models in to three different dimensions.

6- Name two approaches for the simulation clock advancing.

7- Write the differential equations for predator-prey problem.

8-Find the value of the following integral by using the Monte-Carlo method (use 6 points).

$$I = \int_{\pi/4}^{3\pi/4} \log_e(\sin x)\,dx$$

a) Generate U(0,1)by computer or any means (if you cannot use the following RNG):
U=0.012 0.238 0.123 0.880 0.813 0.763

b) Use the relation: X=(Π/2)U+ Π/4 to map from U(0,1) into X(Π/4, 3 Π/4)

c) Then use $g(x_i)= \log_e(\sin x_i)$ to find $g(x_i)$ and fill the following table:

Table 1

i	*1*	*2*	*3*	*4*	*5*	*6*
x_i						
$g(x_i)$						

Using Monte-Carlo with 6 points: I=

9-In the following single server queuing MM1 system, find:
a) Average delay in queue.
b) Average number of customers in the queue.
c) Efficiency of utilization of the server.

(↑ i means i th arrival *and* ↓ i means i th departure)
(n=7, T(n)=14.2)