Simulation Exam **Name:** **University of the Ryukyus**
3-rd year undergraduate No: **Faculty of Engineering**
2006-2-13 **Department of Information Eng.**
Time: 90 minutes (write answers in boxes) **Prof. M.R. Asharif**

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Use the table-look-up method to simulate random variables X from U(0,1).

Where the p.d.f of X is: $f(x)=3x^2/(1+x^3)$, $0=< x=<(e-1)^{1/3}$ *10%*

Also, find the value of X when U=0.1

(Hint: see page 95)

2- Simulate a Binomial random variable X with B(8,0.35) from a set of uniform random variables U (0,1), by using Bernouli random variable, where:

U1=0.82, U2=0.24, U3=0.36, U4=0.45, U5=0.34, U6=0.76, U7=0.28, U8=0.56

10%

(Hint: See page 82)

p=0.35

***3*- In randomised response technique (RRT), if we have p_0 for answering [N], $(1-p_0)$ for answering [E] and Pr[Yes|N]=0.9, and total probability from survey is: Pr[Yes]=0.9, find the Pr[Yes| E] =?**

(Hint: See page 51) *10%*

***4*- In the mixed congruential generator: EMBED Equation.3**

Simulate the first five numbers with seed EMBED Equation.3 . Then find the correlation between two successive numbers.

5%

5%

(Hint: See page 60-61)

5- ***Simulate the normal distributed random variables (N1, N2) by using Polar-***

Marsaglia method (rejection method) from each pair of the following uniform distributed random variables: *(Hint: See page 80)*
(V1,V2)=(0.8,0.7) , (V1,V2)=(0.6,0.8), (V1,V2)=(0.3,-0.4)

10%

6- If y=exp(-x) and x is a random variable with the exponential p.d.f f(x)=exp(-x), then find the probability density function (p.d.f) of random variable, f(y).

10%

(*Hint: See page 33*)

***7-* Simulate the Gamma distributed random variables, G, with EMBED Equation.3 for n=5, EMBED Equation.3 from the following uniform distributed random variables, U(0,1):**
U1=0.453, U2=0.906, U3=0.543, U4=0.679, U5=0.271 *10%*
(*Hint: See page 82*)

***8-* Simulate a Poisson distribution random variable, K, with parameter EMBED Equation.3 from the following uniform random variables:**
U1= 0.95, U2= 0.89, U3= 0.78, U4= 0.69, U5=0.72

10%

(Hint: See page 84)

***9*- Simulate the random variable X with the following probabilities:**

(Hint: see page 93) *10%*

From a U(0,1) in the following table:

I	0	1	2	3	4	5	6
Pr [X<I]	0.212	0.327	0.687	0.917	0.923	0.924	0.956

X=

X|u=0.1 =

(N1,N2)= , (N1,N2)= , (N1,N2)=

EMBED Equation.3

X=

U	0.954	0.945	0.329	0.689	0.678	0.326	0.211
X							

x(0)=1, x(1)= ,x(2)= ,x(3)= ,x(4)= , x(5)=

Pr[Yes | E] =

f(y) =

G=

K=