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Faculty of Information Technology
 Department of CS
Marking Scheme

Module Name: Simulation and Modelling Second Exam Semester one of the academic year:
 Module Number: 750472 2014-2015

Date: 4/1/2015 Time One hour

Basic Part:

Objective: This part aims to show student capability to check RNs.

Q1/ (6 marks)

Let us define the following ten random numbers:

0.12	0.68	0.23	0.89	0.46	0.31	0.76	0.94	0.52	0.54
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Implement KS-test algorithm to check uniformity of RNs.

Hint: define a number of classes with their intervals and then calculate the corresponding frequency for each class.

(N)	95%
1	.975
2	.842
3	.708
4	.624
5	.565
6	.521
7	.486
8	.457
9	.432
10	.410

Class	1	2	3
Interval	0--0.3	0.31--0.6	0.61--1
Fr	2	4	4
ACC	2	6	10
Fn	0.2	0.6	1
Fi	0.1	0.2	0.3
error	0.1	0.4	0.7

max=0.7

from the table= 0.41

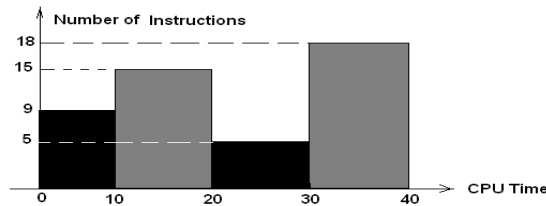
Non uniform since $KS(\text{theoretical}) > KS(\text{Table})$

Familiar Part:

Objective: This part aims to apply discrete simulation algorithms to show system analysis and behavior.

Q2/(7 marks)

Assume that we have following system behavior:



Generate RVs under empirical distribution for the corresponding three RNs {0.17, and 0.76}.

X	# Ins	pdf	cdf
0--10	9	0.1915	0.1915
10--20	15	0.3191	0.5106
20--30	5	0.1064	0.617
30--40	18	0.383	1
	47		

RN=0.17	$x_j = x_i + (y_j - y_i) * ((x_i + 1 - x_i) / (y_i + 1 - y_i))$	8.877285
RN=0.76		33.73368
RN=0.41		16.84738

Unfamiliar Part:

Objective: this part aim to check student ability to find observations based on other observations.

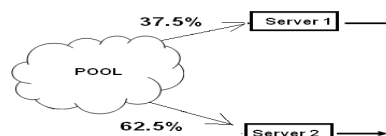
Q3/(7 marks)

Let us define the following timetable (discrete model):

Process No.	Arrival Time	Service Time
1	1+4	4
2	2+2	1
3	3+6	5
4	5+3	2
5	6+1	1
6	7+2	4
7	8+3	2
8	9+1	1

Find the following requirements:

1- Perform 3-steps (ABC) discrete simulation technique on two parallel servers as the following:



Find ABC columns where the arrival time M+N means that the process arrived at the time M and it needs N time to complete its arrival. Compute total waiting time and utilization.

Number Of Processes Assign To Server1 = $(37.5 * 8) / 100 = 3$

Number Of Processes Assign To Server2 =8-3=5

We select p1, p3, and p6 to assign to server1

The other are assigned to server2

A	B	C
-	-	P1/A=1, P1/AE=5
1	P1/A	P1/AE=5,P2/A=2, P2/AE=4
2	P2/A	P1/AE=5,P2/AE=4, P3/A=3, P3/AE=9
3	P3/A	P1/AE=5,P2/AE=4, P3/AE=9, P4/A=5, P4/AE=8
4	P2/AE	P1/AE=5, P3/AE=9, P4/A=5, P4/AE=8, P2/D2=5
5	P1/AE, P4/A, P2/D2	P3/AE=9, P4/AE=8, P5/A=6, P5/AE=7, P1/D1=9
6	P5/A	P3/AE=9, P5/AE=7, P1/D1=9, P4/AE=8, P6/A=7, P6/AE=9
7	P5/AE, P6/A	P3/AE=9, P1/D1=9, P4/AE=8, P6/AE=9,P5/D2=8, P7/A=8, P7/AE=11
8	P5/D2, P7/A, P4/AE	P3/AE=9, P1/D1=9, P6/AE=9, , P7/AE=11, P8/A=9, P8/AE=10, P4/D2=10
9	P3/AE, P1/D1, P8/A, P6/AE*	P7/AE=11, P8/AE=10, P4/D2=10, P3/D1=14
10	P4/D2, P8/AE	P7/AE=11, P3/D1=14, P8/D2=11,
11	P8/D2, P7/AE	P3/D1=14, P7/D2=13
13	P7/D2	P3/D1=14
14	P3/D1	P6/D1=18
18	P6/D1	-

$$\rho = \frac{\sum S_i}{T'} = \frac{14}{11} = 1.27$$

$$\sum w = 5$$