QFO-AP-FI-21	اسم النموذج: نموذج حل الامتحان	جامعة فيلادلفيا Philadelphia University
رقم الاصدار: 2 Revision 2	الجهة المصدرة: كلية تكنولوجيا المعلومات	
التاريخ: 2018/11/14	الجهة المدققة: عمادة ضمان والجودة	
عدد صفحات النموذج: 1		

Lecturer: Prof. Nameer N. EL-Emam
Internal Examiner: Dr. Raad Alwan
Semester one of academic year: 2019-2020
Department of CS
Course Name: Computation Theory
Date: 18/12/2019
Time: 50 min.

Second Exam

Basic Part:

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

Q1/ (10 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

Implement KS test algorithm to check the uniformity of RNs.

Classes	Frequency
Class1 [0-0.333]	3
Class2 [0.334-0.666]	3
Class3 [0.667-1]	4

index	1	2	3
frequency	3	3	4
ACC	3	6	10
F(ACC)	0.3	0.6	1
F(index)	0.3333	0.6666	1
error	0.0333	0.0666	0

Max error = 0.0666
KS (theoretical) = 0.0666

Kolmogorov-Smirnov Table

n\α	0.001	0.01	0.02	0.05	0.1	0.15	0.2
1		0.99500	0.99000	0.97500	0.95000	0.92500	0.90000
2	0.97764	0.92930	0.90000	0.84189	0.77639	0.72614	0.68377
3	0.92063	0.82900	0.78456	0.70760	0.63604	0.59582	0.56481
4	0.85046	0.73421	0.68887	0.62394	0.56522	0.52476	0.49265
5	0.78137	0.66855	0.62718	0.56327	0.50945	0.47439	0.44697
6	0.72479	0.61660	0.57741	0.51926	0.46799	0.43526	0.41035
7	0.67930	0.57580	0.53844	0.48343	0.43607	0.40497	0.38145
8	0.64098	0.54180	0.50654	0.45427	0.40962	0.38062	0.35828
9	0.60846	0.51330	0.47960	0.43001	0.38746	0.36006	0.33907
10	0.58042	0.48895	0.45662	0.40925	0.36866	0.34250	0.32257
11	0.55588	0.46770	0.43670	0.39122	0.35242	0.32734	0.30826
12	0.53422	0.44905	0.41918	0.37543	0.33815	0.31408	0.29573

KS (experimental)=0.409
We conclude that KS (theoretical) < KS (experimental)
Then RNs are under uniform distribution

Familiar Part:

***Objective*:** this part aims to generate observation for discrete simulation model

Q2/(10 marks)

Assume that we have the following *time analysis* for the behavior of clients/server(s) simulation problem:

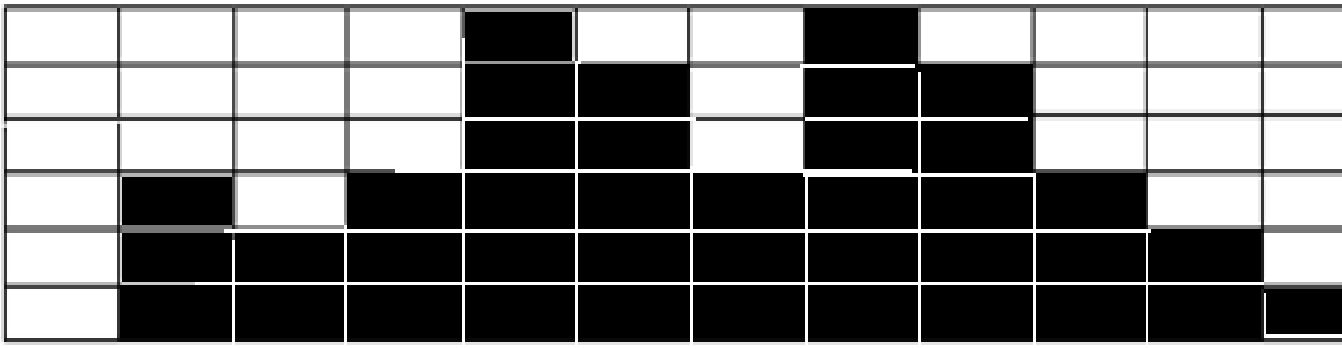
Answer the following requirements

1- Construct discrete model, which includes (Process No., Inter-Arrival time, Departure time, Waiting time, and service time) when NES discrete simulation is used.
2- How many server(s) and queue(s) are proposed to use in the one layer system network. You should justify your answer.
3- Compute utilization, and draw your conclusion.

Familiar Part:

Objective: This part aims to show student capability to find solution of the problem (problem solving approach).

Q2/ (8 marks): Assume that we have the following *time analysis* for the behavior of clients/server(s) simulation problem:

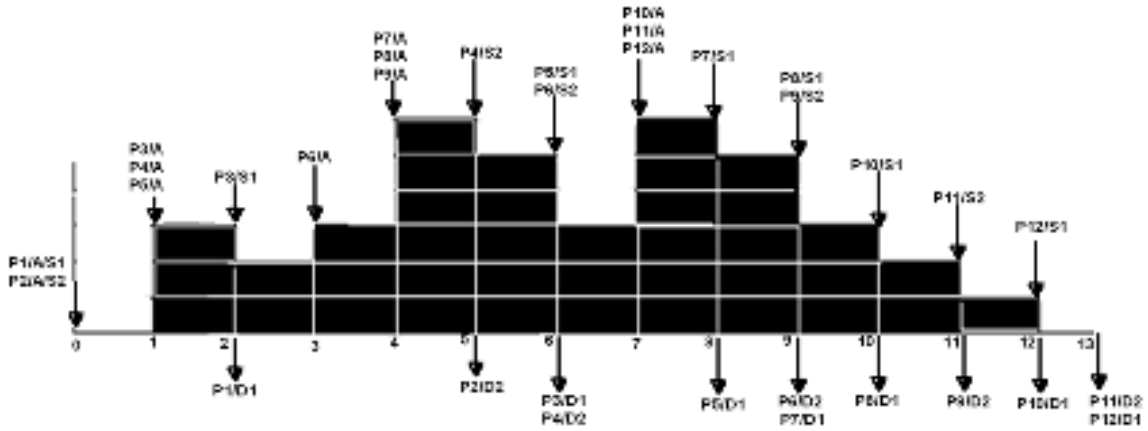


Answer the following requirements

4- Construct discrete model, which includes (Process No., Inter-Arrival time, Departure time, Waiting time, and service time) when NES discrete simulation is used.

5- How many server(s) and queue(s) are proposed to use in the one layer system network. You should justify your answer.

6- Compute utilization, and draw your conclusion.



1) Discrete Model

P#	1/λ	D	W	S
1	0	2	0	2
2	0	5	0	5
3	1	6	1	4
4	0	6	4	1
5	0	8	5	2
6	2	9	3	3
7	1	9	4	1
8	0	10	5	1
9	0	11	5	2
10	3	12	3	2
11	0	13	4	2
12	0	13	5	1

2) Two servers and three queues are needed, where the maximum progression of waiting in one time unit is 3 while the maximum decline of waiting in one time unit is 2.

3) Utilization= sum of Si/T' = 13/7= 1.85 -→ need to add two servers.