OPER 441 **Quiz # 2** **First semester 1444**

Department of Statistics and Operations Research
King Saud University

الاسم : الرقم :

Problem 1 :

The number of customers that arrive to a bank in an interval of time has a Poisson distribution with mean 7 per hour customers per hour. Determine the time of arrival of the 6th customer by completing the table.

حدد زمن وصول الزبون السادس مستعينا بتكملة الجدول التالي .

k	u_k	t_k	x_i
1	0.2379	0.0388	0.0388
2	0.7551	0.2010	0.2398
3	0.2989	0.0507	0.2905
4	0.2470	0.0405	0.3311
5	0.3237	0.0559	0.3869
6	0.2972	0.0504	0.4373

Arrival time of the 6th Customer = 0.4373

Problem 2 : Consider the following set of $n = 50$ random numbers.

0.2379	0.7551	0.2989	0.247	0.3237
0.2972	0.8469	0.4566	0.6146	0.6723
0.9496	0.2268	0.8699	0.9084	0.5649
0.3045	0.6964	0.1709	0.3387	0.9804
0.1246	0.842	0.6557	0.9672	0.3356
0.3525	0.8075	0.9462	0.9583	0.3807
0.1489	0.5480	0.9537	0.9376	0.8364
0.5095	0.4047	0.9058	0.3795	0.6242
0.5195	0.6545	0.1117	0.3258	0.8589
0.6536	0.3427	0.6653	0.7864	0.5824

Test the hypothesis that these numbers are drawn from U(0,1) at a 95% confidence

Interval ($\alpha = 0.05$) using the Chi-squared goodness of fit test ($n = 50,$ and $k = 10$).

استعمل الجدول التالي :

j	b_{j-1}	b_j	c_j	$\frac{\left(c_j - \frac{n}{k}\right)^2}{\frac{n}{k}}$
1	0.0	0.1	0	5
2	0.1	0.2	4	0.2
3	0.2	0.3	5	0
4	0.3	0.4	9	3.2
5	0.4	0.5	2	1.8
6	0.5	0.6	5	0
7	0.6	0.7	8	1.8
8	0.7	0.8	2	1.8
9	0.8	0.9	6	0.2
10	0.9	1.0	9	3.2

$$\chi_p^2 = \sum (9 - \tfrac{n}{k})^2 / \tfrac{n}{k} = 17.2$$

Table : $14.684 \leq 17.2 \leq 16.919 \Rightarrow p > 0.05$

$\chi^2_{0.1} \quad \chi^2_p \quad \chi^2_{0.05} \Rightarrow$ Accept H_0.

Problem 3 : Consider the following set of 20 random numbers (see table الجدول).

R_i	
0.2379	0.7551
0.2972	0.8469
0.9496	0.2268
0.3045	0.6964
0.1246	0.842
0.3525	0.8075
0.1489	0.5480
0.5095	0.4047
0.5195	0.6545
0.6536	0.3427

i	$R_{(i)}$	$\frac{i}{N} - R_{(i)}$	$R_{(i)} - \frac{(i-1)}{N}$
1	0.1246	–	0.1246
2	0.1489	–	0.989
3	0.268	–	0.1268
4	0.2379	–	0.0879
5	0.2972	–	0.0972
6	0.3045	–	0.0545
7	0.3427	0.0073	0.0427
8	0.3525	0.0475	0.0025
9	0.4047	0.0453	0.0047
10	0.5095	–	0.0595
11	0.5195	0.0305	0.0195
12	0.5480	0.052	–
13	0.6536	–	0.0536
14	0.6545	0.0455	0.0095
15	0.6964	0.0536	0.0551
16	0.7551	0.0449	0.0551
17	0.8075	0.0425	0.0075
18	0.842	0.058	–
19	0.8469	0.1031	–
20	0.9496	0.0504	–

Test the hypothesis that these numbers are drawn from U(0,1) at a 95% confidence Interval ($\alpha = 0.05$)

using the Kolmogorov-Smirnov test.

$D^+ = 0.1031$

$D^- = 0.1268$

$D = 0.1268$

$D_\alpha = 0.41$

$D_\alpha > D$

نقبل الفرضية

Accept