Primeasia University

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Department of Computer Science and Engineering (CSE)

Final Term (Part -1) Examination, Summer Semester, 2020

Course No.: CSE 417 **Full Marks: 20**

Course Title: Simulation and Modeling **Time: 50 minutes**

There are **Three** questions. Answer any **Two** of them. Figures in the right-hand margin indicate full marks.

1. Determine the value of π using Monte Carlo method. The diameter of the circle is 6 unit and the center is (0,0). Do the simulation for 30 pairs of random number and take a half of circle to do the simulation. 10

2. Perform the Kolmogorov-Smirnov Test to test the uniformity of the following random numbers with a level of confidence 95%, 99% and 85% 10

   0.24, 0.37, 0.55, 0.71, 0.97, 0.86, 0.41, 0.64, 0.65, 0.29, 0.84, 0.78, 0.23

   0.89, 0.11, 0.61, 0.23, 0.50, 0.65

   Table for Kolmogorov-Smirnov test

Degrees of freedom	$\alpha = 0.15$	$\alpha = 0.01$	$\alpha = 0.05$
1	0.925	0.995	0.975
2	0.726	0.929	0.842
3	0.596	0.829	0.708
4	0.525	0.734	0.624
5	0.474	0.669	0.565
6	0.435	0.617	0.521
7	0.405	0.576	0.486
8	0.381	0.542	0.457
9	0.360	0.513	0.432
10	0.343	0.489	0.410
11	0.327	0.468	0.391
12	0.314	0.449	0.375
13	0.302	0.432	0.361

14	0.291	0.418	0.349
15	0.282	0.404	0.338
16	0.274	0.392	0.328
17	0.266	0.381	0.318
18	0.259	0.371	0.309
19	0.252	0.361	0.301
20	0.246	0.352	0.294
25	0.221	0.317	0.270

3. 100 random numbers generated by a multiplicative congruential method are given below. Determine Chi-square. Is it acceptable at $\alpha = 0.10, 0.02, 0.05, 0.2$ confidence level? 10

41	11	61	02	21	06	22	02	20	10
23	31	81	33	32	90	52	71	82	30
80	05	51	01	45	93	09	72	53	97
19	57	73	55	87	75	35	46	13	63
90	94	88	58	76	89	99	74	59	05
37	54	12	66	07	45	34	22	83	60
49	81	56	80	85	25	79	54	91	36
33	28	03	87	55	15	06	70	50	27
95	38	77	13	80	36	58	84	40	100
04	85	48	34	91	62	30	31	17	08

Table for Chi-square Distribution

Degrees of freedom	$\alpha = 0.20$	$\alpha = 0.10$	$\alpha = 0.05$	$\alpha = 0.02$
1	1.642	2.706	3.841	5.412
2	3.219	4.605	5.991	7.824
3	4.642	6.251	7.815	9.837
4	5.989	7.779	9.448	11.668
5	7.289	9.239	11.070	13.388
6	8.558	10.645	12.592	15.033
7	9.803	12.017	14.067	16.622

8	11.030	13.362	15.507	18.168
9	12.242	14.684	16.919	19.679
10	13.442	15.987	18.307	21.161
11	14.631	17.275	19.675	22.618
12	15.812	18.549	21.026	24.054
13	16.985	19.812	22.362	25.472
14	18.151	21.064	23.685	26.873
15	19.311	22.307	24.996	28.259
16	20.465	23.542	26.296	29.633
17	21.615	24.769	27.587	30.995
18	22.760	25.989	28.869	32.346
19	23.900	27.204	30.144	33.687
20	25.038	28.412	31.410	35.020