LCGRandomNumberGenerator.cpp 2-Feb-19
CS 4499 Dr. Kerby
Written By: Katherine Wilsdon

100 Random Numbers
Mean: 0.47396

Bin	
0	1
1	1
2	2
3	0
4	1
5	2
6	1
7	1
8	1
9	1
10	1
11	0
12	0
13	1
14	2
15	3
16	1
17	3
18	0
19	2
20	0
21	0
22	1
23	0
24	2
25	1
26	2
27	0
28	1
29	0
30	3
31	1
32	3
33	2
34	1
35	0
36	1
37	2
38	2
39	1

10,000 Random Numbers
Mean: 0.501333

Bin	
0	91
1	102
2	114
3	90
4	108
5	115
6	106
7	98
8	104
9	117
10	96
11	108
12	87
13	96
14	122
15	108
16	94
17	93
18	83
19	113
20	82
21	89
22	82
23	109
24	89
25	93
26	88
27	91
28	93
29	110
30	101
31	100
32	105
33	108
34	92
35	91
36	103
37	82
38	96
39	115

40	0	40	106
41	3	41	100
42	0	42	104
43	2	43	111
44	0	44	100
45	0	45	119
46	2	46	85
47	1	47	104
48	1	48	99
49	0	49	114
50	1	50	91
51	0	51	95
52	2	52	107
53	1	53	73
54	1	54	106
55	1	55	95
56	1	56	97
57	0	57	88
58	1	58	87
59	0	59	99
60	0	60	121
61	2	61	97
62	2	62	96
63	1	63	107
64	1	64	100
65	0	65	103
66	1	66	108
67	1	67	102
68	2	68	107
69	0	69	94
70	1	70	99
71	0	71	102
72	1	72	115
73	1	73	104
74	1	74	106
75	0	75	102
76	3	76	97
77	1	77	72
78	0	78	91
79	0	79	101
80	1	80	107
81	0	81	92
82	2	82	116
83	0	83	82
84	0	84	88
85	1	85	85
86	1	86	87

87	0	87	95
88	0	88	112
89	0	89	113
90	1	90	107
91	0	91	120
92	1	92	95
93	1	93	110
94	2	94	109
95	0	95	87
96	1	96	106
97	1	97	118
98	2	98	97
99	4	99	106

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1,000,000 Random Numbers
Mean: 0.499695

Bin	
0	9837
1	10049
2	9869
3	9805
4	9865
5	10101
6	10025
7	9985
8	10217
9	9978
10	10272
11	10030
12	10105
13	10078
14	9940
15	9770
16	9994
17	10067
18	9883
19	10126
20	10148
21	10014
22	10076
23	10050
24	10200
25	9851
26	9914
27	9950
28	10088
29	9951
30	10063
31	9953
32	10023
33	9996
34	9946
35	9969
36	9996
37	9863
38	10191
39	10090

100,000,000 Random Numbers
Mean: 0.500002

Bin	
0	999955
1	999982
2	999957
3	999948
4	999833
5	999998
6	999978
7	1000006
8	999973
9	999824
10	1000030
11	999989
12	1000027
13	999932
14	999913
15	1000061
16	999933
17	999969
18	1000030
19	1000073
20	1000022
21	1000171
22	1000032
23	1000062
24	999976
25	999986
26	1000025
27	999921
28	1000049
29	1000078
30	999999
31	1000128
32	999965
33	1000090
34	1000132
35	999957
36	999886
37	999973
38	999983
39	1000007

40	10090	40	1000002
41	10098	41	1000073
42	9816	42	999941
43	10013	43	1000046
44	10174	44	999942
45	10024	45	1000071
46	9902	46	999950
47	9921	47	1000057
48	10063	48	999995
49	10051	49	1000135
50	10007	50	999909
51	10020	51	1000013
52	10040	52	1000094
53	9935	53	1000010
54	10100	54	999984
55	9968	55	999931
56	10065	56	1000028
57	10098	57	1000150
58	10034	58	1000128
59	10089	59	1000017
60	9963	60	999879
61	9888	61	999935
62	9938	62	999916
63	9880	63	999904
64	10095	64	999941
65	10063	65	1000009
66	9920	66	1000059
67	9881	67	1000032
68	10066	68	1000028
69	9987	69	999879
70	9827	70	1000035
71	10143	71	999940
72	10101	72	1000050
73	10149	73	1000109
74	9773	74	999926
75	9955	75	999924
76	10013	76	1000027
77	10141	77	999974
78	10106	78	999852
79	10064	79	999888
80	9926	80	999978
81	10057	81	1000148
82	9893	82	1000124
83	10003	83	999882
84	10010	84	999879
85	9908	85	1000023
86	9888	86	999990

87	10101	87	1000001
88	9827	88	1000055
89	9819	89	1000004
90	9985	90	999970
91	9860	91	999981
92	9934	92	1000152
93	10097	93	999869
94	10072	94	999987
95	10016	95	1000109
96	9889	96	1000122
97	9925	97	999929
98	10018	98	1000095
99	9983	99	1000066

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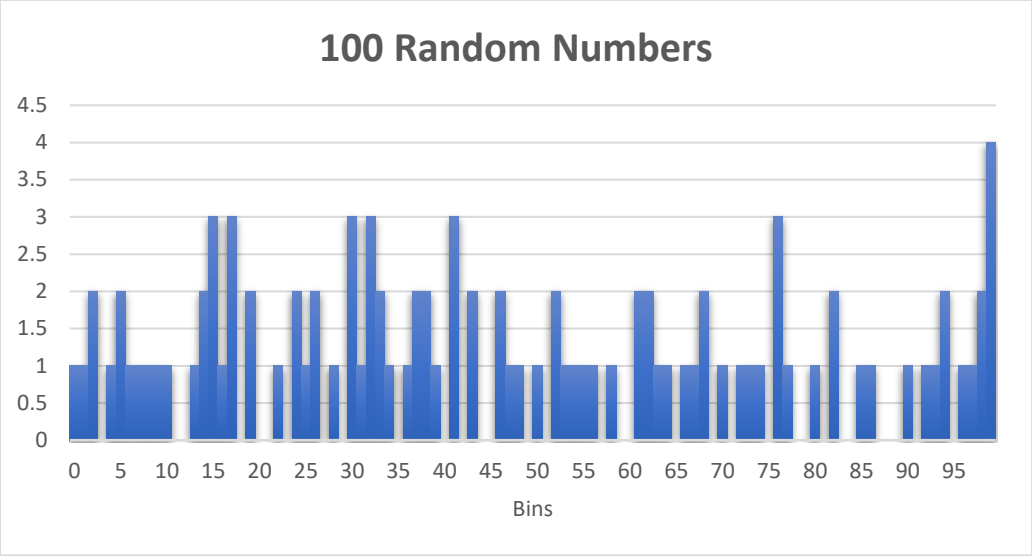
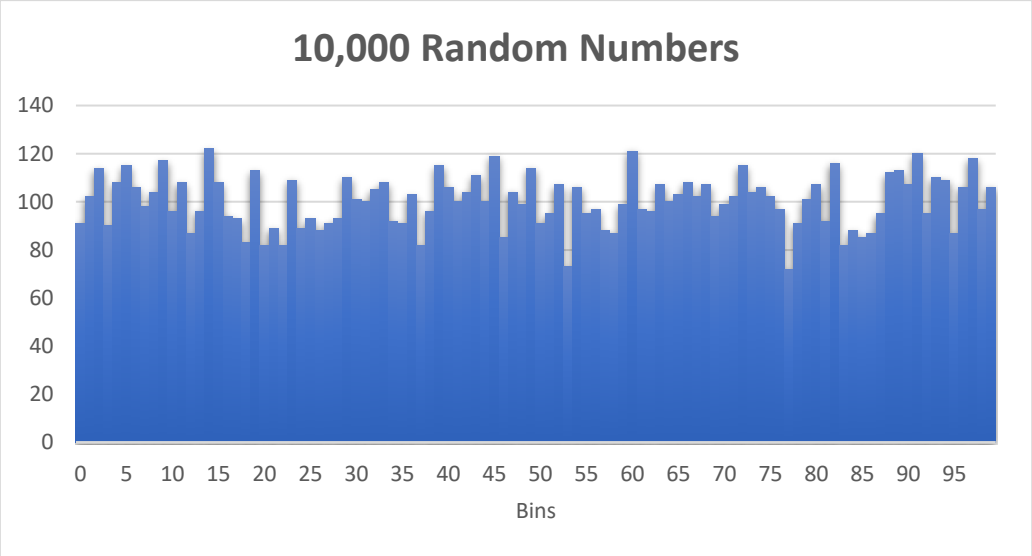
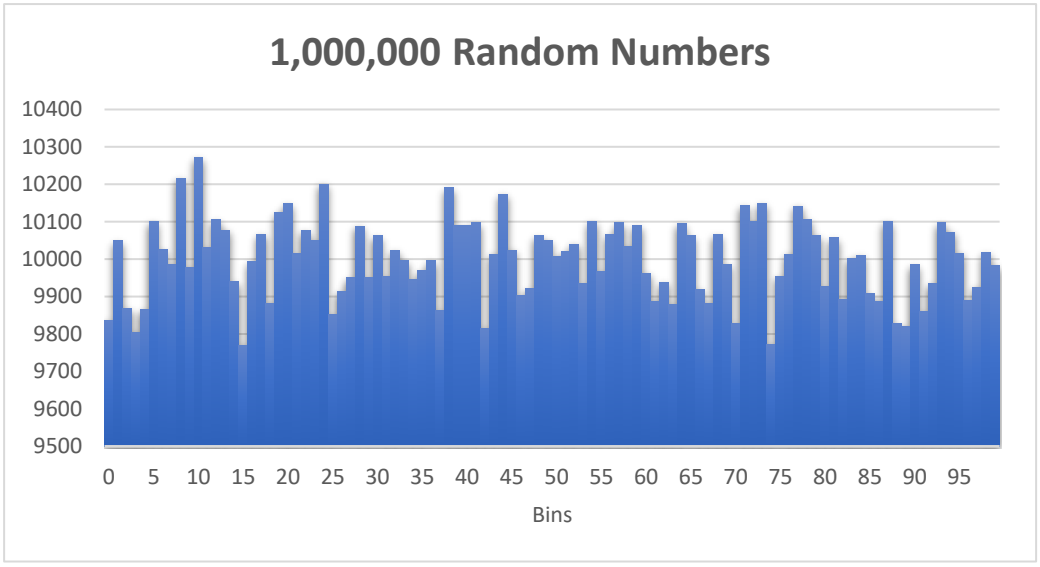
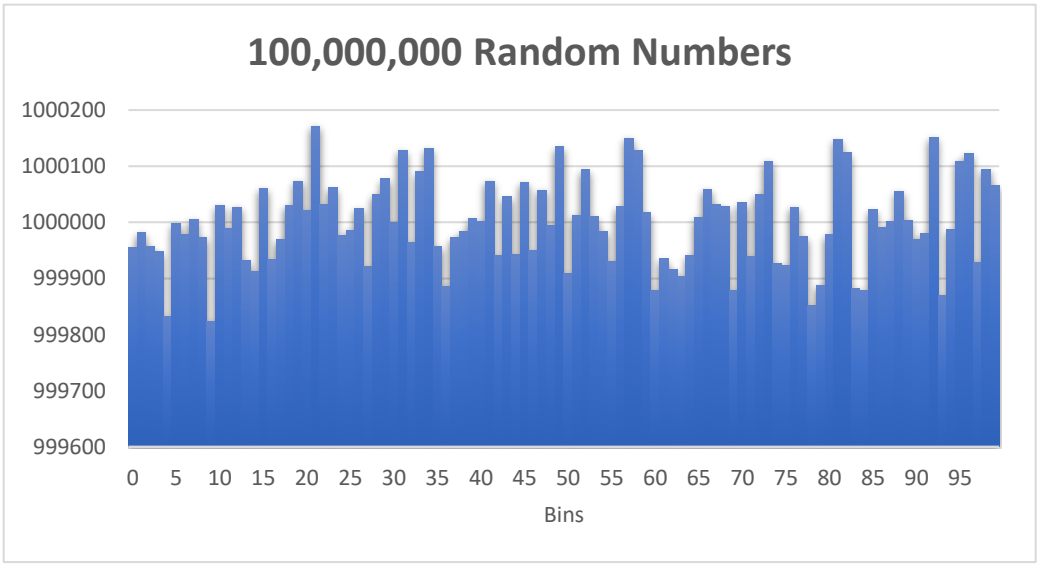





1,000,000 Random Numbers
10400
10300
10200
10100
10000
9900
9800
9700
9600
9500
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
Bins


100,000,000 Random Numbers
1000200
1000100
1000000
999900
999800
999700
999600
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
Bins

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2-Feb-19
Dr. Kerby

1. 100 Random Numbers - Mean: 0.47396
   10,000 Random Numbers - Mean: 0.501333
   1,000,000 Random Numbers - Mean: 0.499695
   100,000,000 Random Numbers - Mean: 0.500002

   If it was a perfect pseudorandom number generator the mean would be 0.50000000 when normalized between 0 and 1. As more random numbers are generated, the mean gets closer and closer to 0.50000000. When generating 100 million random numbers, the mean is very close to a perfect pseudorandom number generator.

2. A perfect pseudorandom number generator would be a rectangle histogram. However, the LCG random number generator is not a rectangle histogram. The general outline is a rectangle, but some bins have too many or too few random numbers resulting in a jagged histogram.