

ENE 3031 - Fall 2014
Homework 3
due Wednesday Oct/8

1. Use the linear congruential method to generate a sequence of three two-digit random integers and corresponding random numbers. Let $X_0 = 27$, $a = 8$, $c = 47$, and $m = 100$.
2. Consider the numbers below and use the χ^2 goodness-of-fit test, with $\alpha = 0.05$, to learn whether the hypothesis that the numbers are uniformly distributed on the interval $[0, 1]$ can be rejected.

0.43	0.09	0.52	0.98	0.78	0.44	0.21	0.12	0.64	0.76
0.38	0.67	0.97	0.46	0.07	0.18	0.49	0.47	0.22	0.47
0.69	0.99	0.77	0.76	0.65	0.14	0.25	0.37	0.99	0.20
0.74	0.03	0.71	0.28	0.65	0.50	0.54	0.13	0.87	0.50
0.97	0.17	0.32	0.91	0.28	0.39	0.56	0.73	0.93	0.24
0.99	0.71	0.99	0.64	0.50	0.66	0.01	0.24	0.81	0.94
0.73	0.15	0.45	0.10	0.18	0.82	0.96	0.43	0.57	0.94
0.27	0.34	0.65	0.79	0.03	0.49	0.69	0.85	0.37	0.50
0.60	0.93	0.48	0.42	0.04	0.46	0.04	0.91	0.97	0.26
0.81	0.62	0.79	0.88	0.46	0.74	0.06	0.11	0.92	0.87

3. Consider the multiplicative congruential generator ($c = 0$) under the following circumstances:
 - (a) $X_0 = 7, a = 11, m = 16$
 - (b) $X_0 = 8, a = 11, m = 16$
 - (c) $X_0 = 7, a = 7, m = 16$
 - (d) $X_0 = 8, a = 7, m = 16$

Generate enough values in each case to complete a cycle. What inferences can be drawn? Is maximum period achieved?

4. Test the following sequences of numbers for independence using the runs test:
 0.594, 0.928, 0.515, 0.055, 0.507, 0.351, 0.262, 0.797, 0.788, 0.442, 0.097,
 0.798, 0.227, 0.127, 0.474, 0.825, 0.007, 0.182, 0.929, 0.852.
5. Develop a generation scheme for the triangular distribution with pdf

$$f(x) = \begin{cases} \frac{1}{2}(x-2), & 2 \leq x \leq 3; \\ \frac{1}{2}(2-\frac{x}{3}), & 3 \leq x \leq 6; \\ 0 & \text{otherwise.} \end{cases} \quad (1)$$