ECE 3340 Numerical Methods

Homework 12: Probability and Random Numbers

Name: **ID:**

Problem 1: Multiplicative Linear Congruential Generators

Determine the period of a 5-bit MLCG with a modulus of 31 and a multiplier of 4 by selecting a seed and evaluating.

Period

Problem 2: Linear Congruential Generators

Select the missing parameters to maximize the period for the following LCGs **by meeting the Hull-Dobel criterion**, where m is the modulus, a is the multiplier, and c is the increment:

$m = 24 \qquad a = 7 \qquad c =$ (list all possible values)

$m =$ $\qquad a = 11 \qquad c = 9$ (5-bit register)

$m = 8 \qquad a =$ $\qquad c = 5$

Problem 3: C++ Random Number Generators

Write the code to generate random numbers in the range $[0, 2\pi)$ using the Mersenne Twister algorithm. Seed it with the number of seconds since January 1, 1970.