# EE1103 : Random Numbers

1. A popular algorithm to generate random numbers is

$$I_{j+1} = aI_j + c \,(\mathrm{mod}\, m)\,, \tag{1}$$

where $m$ is the modulus, $a$ is the multiplier and $c$ is the increment respectively. The recurrence will eventually repeat itself with a period no greater than $m$. If $m$, $a$ and $c$ are properly chosen, then the period of maximum length $m$ with all possible numbers between 0 and $m-1$ will occur. The initial value $I_0$ is called a seed and the sequence takes off from there.

   (a) Write a program to generate a random numbers with $a = 1103515245$, $c = 12345$ and $m = 2^{32}$ (These values are specified in an ANSI C committee example). Generate different sets of random numbers for different seed values. Print out the mean and standard deviation in each case.

   (b) How do I modify the program to obtain numbers between 0 and 1?

   (c) Can you observe any disadvantages of using this formulation? What happens if you decrease $m$?

2. Generate a plot of the histogram of a set of random numbers that you generated above? What inferences can you draw from this histogram? Does it resemble a normal distribution?