Assignment 1. Random Numbers Marks 20

Posted on 13.08.2025 @ 2:30 pm and due on 14.08.2025 @ 5:45 pm

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1. Use the iterative equation $x_{i+1} = c\,x_i\,(1 - x_i)$ to generate 1,000 random numbers. Show the correlation among them by plotting x_i vs x_{i+k}. Use seed $x_0 = 0.1$ but choose your own five different c. Try various k, say 3, 5 and 10. **[5]**

2. Write your own LCG random generator with the following set of parameters $a = 1103515245$, $c = 12345$, $m = 32768$ and again check for correlation by plotting for $k = 5$. `You must store your LCG code in the library file for all future use till Endsem.` **[5]**

3. Determine the value of π using *throwing method* by choosing a quarter circle of unit radius in the first quadrant. Plot the value of π versus number of throws $20 \leq N \leq 2,000$. **[5]**

4. Generate pRNG having exponential distribution of the form $\exp(-x)$ from pRNG having uniform distribution in $[0, 1)$. Generate at least 5,000 random numbers **[5]**

```
import matplotlib.pyplot as plt
import numpy as np
from mylib import *

# Generate random data for the histogram
myrand01=[]

for in range(N):
        myrand=(foat)mylib.lcg()/(float)m
        myrand01.append(myrand)

# Plotting a basic histogram
plt.hist(myrand, bins=40, color='skyblue', edgecolor='black')

# Display the plot
plt.show()
```
