

CMPE 576 (Spring 2018): Assignment 1

Due date: 3 April 2018, in class

You may work in groups of two. In that case, please submit only one copy of the assignment with two names on it.

- Please submit a hardcopy and email me a softcopy of your assignment.*
- Do not copy programs from each other.*
- You might be asked to demonstrate the running of your programs.*

Part 1. Monte Carlo Integration

Write a C/C++ program to evaluate

$$\int_{-\infty}^{\infty} e^{-x^2} dx$$

using the Monte Carlo integration.

Part 2. Generating Discrete Random Variables

Write C/C++ functions for generating random numbers from geometric, binomial, and Poisson distributions. The function prototypes should be as follows:

- `int geometric(double p);`
- `int binomial(int n, double p);`
- `int Poisson(double lambda);`

You may check the correctness of each of your functions by generating 1,000 or more random numbers from these distributions, calculating the sample means and standard deviations and comparing the calculated values to population means and standard deviations.

Part 3. Generating Continuous Random Variables

Write C/C++ functions for generating random numbers from uniform, exponential and normal distributions. The function prototypes should be as follows:

- `/* Uniformly distributed real numbers between a and b */
double uniform(double a, double b);`
- `double exponential(double lambda);`
- `/* Use the Box-Muller transformations to generate normal random numbers */
double normal(double mu, double std);`

You may check the correctness of each of your functions by generating 1,000 or more random numbers from these distributions, calculating the sample means and standard deviations and comparing the calculated values to population means and standard deviations.