United International University (UIU)

Department of CSE

Trimester: Spring 2022

Course Name: | CSI 424 | Simulation & Modeling Laboratory (Section A)

Submission Guideline:

- Please solve the problems in separate files (**One notebook/python file per task**).
- **Download the python files** as instructed in the class. (File -> Download -> Download .py)
- Create a new **folder** and put all your python files inside the folder.
- Rename the folder with your 9 digit student ID.
- Make a ZIP of the folder and **submit the .zip file**.

Please do not copy codes from others/the internet. Each of the offline assignments will be evaluated with a viva. You must be able to explain your code. Also, we will run a copy checker on the submissions. Any plagiarism will be severely penalized.

Offline assignment 3

First, implement two random number generators, G1 and G2. Specifications for these two RNGs are given below:

G1: Follows the mid-square method to generate random numbers from U(0,1). The number of digits after the decimal point in each of the random numbers that are reported at the end will be six. **Use the last six digits of your student id as the seed.**

- Notes:
  - Do not terminate with the repeat of Z_i this time, as you need to fill the vector and might need more values for shuffling later.
  - If 0 appears early in Z_i, you may experiment with changing your seed value to avoid that.

G2: A multiple recursive generator that follows the equation stated below:

$$Z_i = (3Z_{i-1} + Z_{i-2} + 7Z_{i-3}) \ mod \ M$$

Notice that you will need the values of Z_0, Z_1, and Z_2 to start generating the next numbers. Set the values arbitrarily (any three numbers). You also have freedom to choose any M value for your G2.

Now that you have two RNGs, let's make a composite RNG with the shuffling technique. You will generate a random vector of size 64. Use G1 to put values in it and use G2 to produce indices where the modification will occur. Shuffle 16 times. The value of M in G2 can be chosen wisely to reduce computational steps.

Print the final vector.