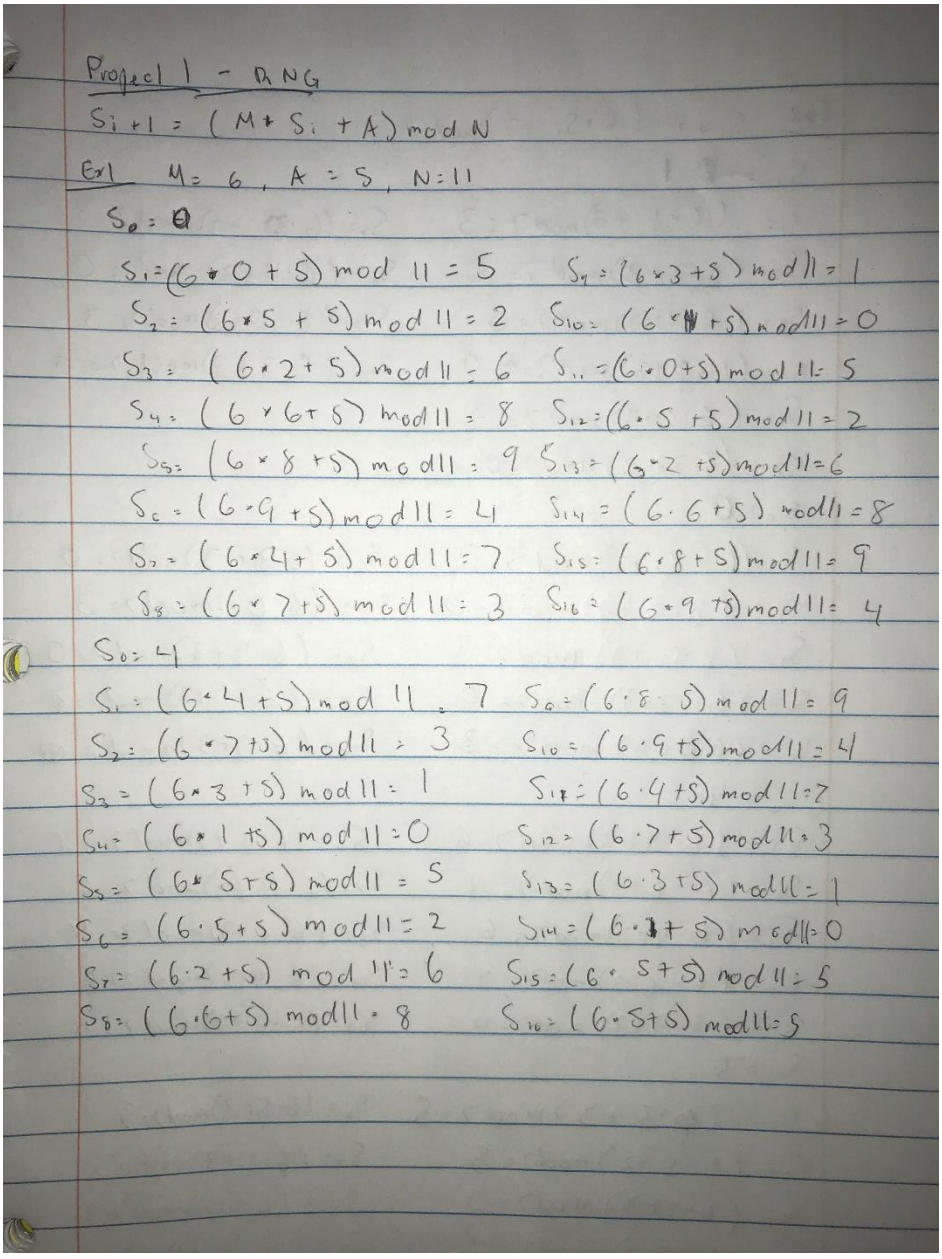
Program 1 – Random Number Generator



Project 1 - RNG

$S_{i+1} = (M * S_i + A) \bmod N$

Ex1 $M = 6, A = 5, N = 11$

$S_0 = 0$

$S_1 = (6 * 0 + 5) \bmod 11 = 5$ $S_9 = (6 * 3 + 5) \bmod 11 = 1$

$S_2 = (6 * 5 + 5) \bmod 11 = 2$ $S_{10} = (6 * 1 + 5) \bmod 11 = 0$

$S_3 = (6 * 2 + 5) \bmod 11 = 6$ $S_{11} = (6 * 0 + 5) \bmod 11 = 5$

$S_4 = (6 * 6 + 5) \bmod 11 = 8$ $S_{12} = (6 * 5 + 5) \bmod 11 = 2$

$S_5 = (6 * 8 + 5) \bmod 11 = 9$ $S_{13} = (6 * 2 + 5) \bmod 11 = 6$

$S_6 = (6 * 9 + 5) \bmod 11 = 4$ $S_{14} = (6 * 6 + 5) \bmod 11 = 8$

$S_7 = (6 * 4 + 5) \bmod 11 = 7$ $S_{15} = (6 * 8 + 5) \bmod 11 = 9$

$S_8 = (6 * 7 + 5) \bmod 11 = 3$ $S_{16} = (6 * 9 + 5) \bmod 11 = 4$

$S_0 = 4$

$S_1 = (6 * 4 + 5) \bmod 11 = 7$ $S_9 = (6 * 8 + 5) \bmod 11 = 9$

$S_2 = (6 * 7 + 5) \bmod 11 = 3$ $S_{10} = (6 * 9 + 5) \bmod 11 = 4$

$S_3 = (6 * 3 + 5) \bmod 11 = 1$ $S_{11} = (6 * 4 + 5) \bmod 11 = 7$

$S_4 = (6 * 1 + 5) \bmod 11 = 0$ $S_{12} = (6 * 7 + 5) \bmod 11 = 3$

$S_5 = (6 * 5 + 5) \bmod 11 = 5$ $S_{13} = (6 * 3 + 5) \bmod 11 = 1$

$S_6 = (6 * 5 + 5) \bmod 11 = 2$ $S_{14} = (6 * 1 + 5) \bmod 11 = 0$

$S_7 = (6 * 2 + 5) \bmod 11 = 6$ $S_{15} = (6 * 5 + 5) \bmod 11 = 5$

$S_8 = (6 * 6 + 5) \bmod 11 = 8$ $S_{16} = (6 * 5 + 5) \bmod 11 = 5$

Ex2 $S_{i+1} = (6 \cdot S_i + 3) \bmod 7$

$S_0 = 1$

$S_1 = (6 \cdot 1 + 3) \bmod 7 = 3$ $S_7 = (6 \cdot 0 + 3) \bmod 7 = 3$

$S_2 = (6 \cdot 3 + 3) \bmod 7 = 0$ $S_8 = (6 \cdot 3 + 3) \bmod 7 = 0$

$S_3 = (6 \cdot 0 + 3) \bmod 7 = 3$ $S_9 = (6 \cdot 0 + 3) \bmod 7 = 3$

$S_4 = (6 \cdot 3 + 3) \bmod 7 = 0$ $S_{10} = (6 \cdot 3 + 3) \bmod 7 = 0$

$S_5 = (6 \cdot 0 + 3) \bmod 7 = 3$

$S_6 = (6 \cdot 3 + 3) \bmod 7 = 0$

$S_0 = 0$

$S_1 = (6 \cdot 0 + 3) \bmod 7 = 3$ $S_6 = (6 \cdot 3 + 3) \bmod 7 = 0$

$S_2 = (6 \cdot 3 + 3) \bmod 7 = 0$ $S_7 = (6 \cdot 0 + 3) \bmod 7 = 3$

$S_3 = (6 \cdot 0 + 3) \bmod 7 = 3$ $S_8 = (6 \cdot 3 + 3) \bmod 7 = 0$

$S_4 = (6 \cdot 3 + 3) \bmod 7 = 0$ $S_9 = (6 \cdot 0 + 3) \bmod 7 = 3$

$S_5 = (6 \cdot 0 + 3) \bmod 7 = 3$ $S_{10} = (6 \cdot 3 + 3) \bmod 7 = 0$

$S_0 = 4$

$S_1 = (6 \cdot 4 + 3) \bmod 7 = 6$ $S_6 = (6 \cdot 6 + 3) \bmod 7 = 4$

$S_2 = (6 \cdot 6 + 3) \bmod 7 = 4$ $S_7 = (6 \cdot 4 + 3) \bmod 7 = 6$

$S_3 = (6 \cdot 4 + 3) \bmod 7 = 6$ $S_8 = (6 \cdot 6 + 3) \bmod 7 = 4$

$S_4 = (6 \cdot 6 + 3) \bmod 7 = 4$ $S_9 = (6 \cdot 4 + 3) \bmod 7 = 6$

$S_5 = (6 \cdot 4 + 3) \bmod 7 = 6$ $S_{10} = (6 \cdot 6 + 3) \bmod 7 = 4$

$S_0 = 5$

$S_1 = (6 \cdot 5 + 3) \bmod 7 = 5$ $S_6 = (6 \cdot 5 + 3) \bmod 7 = 5$

$S_2 = (6 \cdot 5 + 3) \bmod 7 = 5$ $S_7 = (6 \cdot 5 + 3) \bmod 7 = 5$

$S_3 = (6 \cdot 5 + 3) \bmod 7 = 5$ $S_8 = (6 \cdot 5 + 3) \bmod 7 = 5$

$S_4 = (6 \cdot 5 + 3) \bmod 7 = 5$ $S_9 = (6 \cdot 5 + 3) \bmod 7 = 5$

$S_5 = (6 \cdot 5 + 3) \bmod 7 = 5$ $S_{10} = (6 \cdot 5 + 3) \bmod 7 = 5$

```
You'll be asked to enter a seed.

Enter a seed.0
Die Roll
3
3
6
6
3
3
6
6
3
3
6
6
3
2
5
5
2
2
5
5
2
2
5
5
2
Coin Flip
1
1
2
2
1
1
2
2
1
1
2
2
1
1
2
2
1
1
2
2
1
1
2
2
1
```

```
"""
Spyder Editor

This is a temporary script file.
"""

def main():

    def RNG():
        r = []
        # Below are the constants for the rng.
        N = 10000 # The norm.
        A = 4875 # The adder.
        M = 8601 # The multiplier.
        # ----------------------------------------
        # Get seed from clock.
        import time
        S = time.time() - time.process_time()
        # ----------------------------------------

        print("You'll be asked to enter a seed.")
        S = int(input('Enter a seed.'))

        for i in range(25):
            S = (M*S + A) % N
            v = S/N # Random numbers onthe interval [0, 1)
            #print('%.4f' %r)
            #print(format(r, '.4f'))
            r.append(v)
```

```
        # ----------------------------------------
        return r
    def die(r):
        import math
        # Die roll
        print("Die Roll")
        for k in range(25):
            die = math.floor(6*r[k] + 1)
            print(die)
    def coin(r):
        import math
    # Coin Flip
        print("Coin Flip")
        for k in range(25):
            coin = math.floor(2*r[k] + 1)
            print(coin)

    r = RNG()
    die(r)
    coin(r)

main()
```