Assignment 3 - RNG generator

June 29, 2019

0.1 Assignment 3

0.1.1 Problem

Implement the approximate Gaussian RNG based on the Central Limit Theorem. Then determine a good choice of parameter N.

0.1.2 Resolution

We must compute n random variable with uniformalyy distribuited in (0,1). We can do this with the function *random()* of random module form python. After we can use:

$$Z = \frac{\sum_{k=1}^{n} u_k - \frac{n}{2}}{\sqrt{\frac{n}{12}}}$$

$$X = \mu + \sigma Z$$

```
In [1]: from random import *
        import numpy as np

        def compX(n, mu, sigma):
            seed(11)
            rands = []
            for i in range (1, n):
                rands.append(random())
            z=(np.sum(rands)-n/2)/(np.square(n/12))
            s = mu + sigma*z
            print(s)
```

We can observe that the greater is n, the closer X is to the mean value μ. For example:

```
In [2]: compX(10,0,1)

-0.25388582581516456


In [3]: compX(1000,0,1)

0.000977738522279755
```

```
In [4]: compX(100000,0,1)
```

```
-1.9621757359577573e-06
```

Moreover before a certain n value, X is really far from the variance value σ:

```
In [5]: compX(1,0,1)
```

```
-72.0
```

```
In [6]: compX(3,0,1)
```

```
-7.805568966554965
```

```
In [7]: compX(4,0,1)
```

```
-0.5727372874736036
```

We can conclude that a n value less than 4 isn't good for this approach