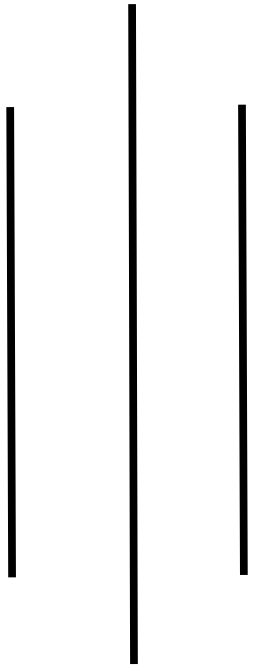
# Deerwalk Institute of Technology

Sifal, Kathmandu



## Simulation and Modelling Practical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# Background Theory

## Linear Congruential Method to generate random numbers.

It is the most commonly used technique for generating ransom numbers and was initially purposed by Lehmer in 1951. This technique provides a sequence of integer between 0 and 1 by following recursive relation:

$$x_{(i+1)} = (a * X_i + c) \bmod m \quad \text{for i=0,1,2,.....}$$

where Xo = Seed

a = multiplier

c = increment

m = modulus

If $c \neq 1$ , then the method is called mixed congruential method, else it is called multiplicative congruential method.

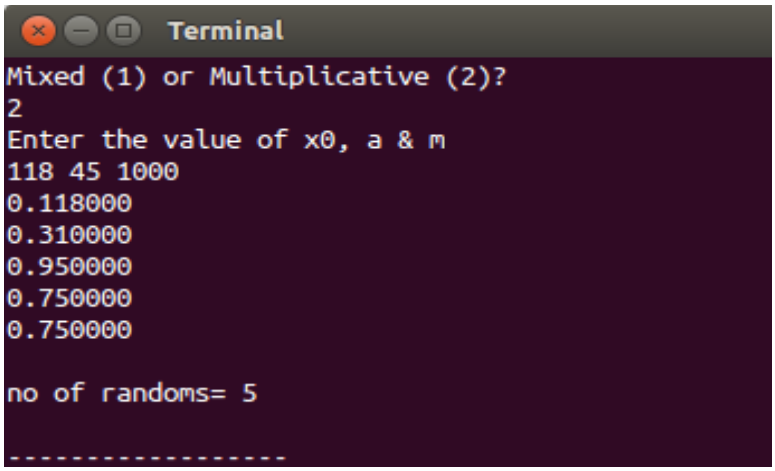
## Program Coding:

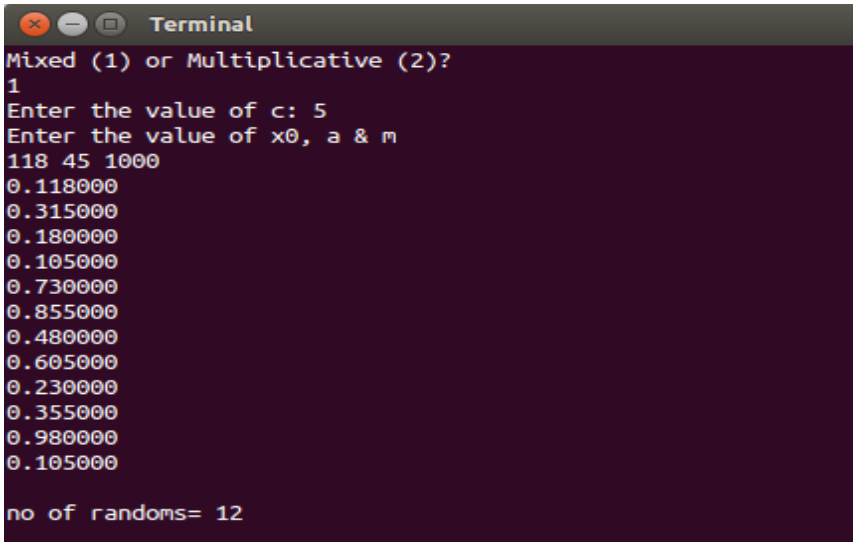
```
#include <stdio.h>
#define MAX 50
int main()
{
	int a,m,c,i,x,j,flag=0,N=0, choice;
	float rand[MAX];
	printf("Mixed (1) or Multiplicative (2)?\n");
	scanf("%d",&choice);
	if(choice == 1)
	{
		printf("Enter the value of c");
		scanf("%d",&c);
	}
	printf("Enter the value of x0, a & m\n");
	scanf("%d%d%d",&x,&a,&m);
	while(1) {
		rand[i] = (float)x/m;

		for(j=0;j<=i;j++) {
			if(i==j) {
				continue;
			}
			else if(rand[i] == rand[j]) {
				flag = 1;
				break;
			}
			else{
				flag = 0;
			}
		}
		x = (a*x+c)%m;
		printf("%f\n",rand[i]);
		N++; i++;
```

```
            if(flag ==1){
                  break;
            }
      }
      printf("\nno of randoms= %d",N);
      return 0;
}
```

## Program Output:




## Conclusion:

Hence the Linear Congruential method was applied to generate a series of random numbers in C-Programming language.