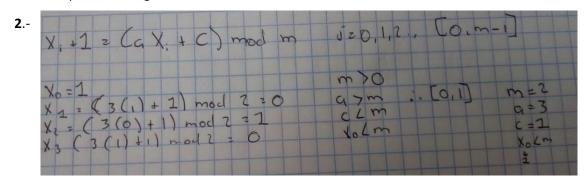
1.-The linear congruential method produces a sequence of integers between zero and m-1 using the relationship:

$$X_{i+1} = (aX_i + c) \mod m, \qquad i = 0, 1, 2, ...$$

$$X_0$$

- $X_{
 m 0}$ The initial value $X_{
 m 0}$ is called the seed;
- a is called the constant multiplier;
- c is the increment
- m is the modulus

When c = 0 the form is called the mixed congruential method; When c = 0, the form is known as the multiplicative congruential method.



3.- What is the best way to choose the parameters for the generator? (The seed, the multiplier, the increment and the modulus)

The interval will be [0, m-1]

m > 0 and a < m, c < m, X < m

It has full period if and only if the following three conditions hold (Hull and Dobell, 1962):

- 1. The only positive integer that (exactly) divides both m and c is 1
- 2. If q is a prime number that divides m, then q divides a-1
- 3. If 4 divides m, then 4 divides a-1
- •For m a power 2, m=2b, and c≠0 Longest possible period P=m=2b is achieved if c is relative prime to m and a=1+4k, where k is an

integer

•For m a power 2, m=2b, and c=0

Longest possible period P=m/4=2b-2 is achieved if the seed X0 is odd and a=3+8k or a=5+8k, for k=0,1,...

•For m a prime and c=0

Longest possible period P=m-1 is achieved if the multiplier a has property that smallest integer k such that ak-1 is divisible by m is k = m-1

4.-

(4)	$m=7$ $a=15$ $c=5$ $x_0=3$	1: Only not that divides m and C is I 2-7 divides m and a-2 3- Remod should be I	
X0=3 X1=[1 X1=6	6(3) + 5] mod 7 2 (50		
Y, = 4	period 27		
X1 = 0 X = 5 X = 3	pened		
fz 1			

M=7 period =7 (with the conditions established before meet)

X; +1 = (a X; + C) mod m	Jz0,1,2, [0,m-1]
Xo=1 X ₁ = (3(1) + 1) mod 2 = 0 X ₁ = (3(0) + 1) mod 2 = 1 X ₃ (3(1) + 1) mod 2 = 0	m >0 a >m ., [0,1] m = 2 c 2 m a = 3 vo 2 m xo 2 m

M=2 period = 2

https://www.mi.fu-berlin.de/inf/groups/ag-tech/teaching/2012_SS/L_19540_Modeling_and_Performance_Analysis_with_Simulation/06.pdf