

# Univerdad Politecnica Salesiana

## Ingenieria de Sistemas

### Materia de Simulación

### Prueba Segundo interciclo

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## Congruencia Lineal

```
In [1]: from collections import Counter
from collections import defaultdict
import random
import psutil
import numpy as np
import pandas as pd
import math
import collections
import matplotlib.pyplot as plt
import math as mt
```

```
In [2]: def congrue_Lineal(x, a, c, mod, it):
aux = 0.00
lis = []
for i in range(it):
    x = (a * x + c) % mod
    aux = round(x/mod,2)
    lis.append(aux)
return lis
```

```
In [3]: def gP(d):
aux1 = 0
aux2 = 0
if d%2 != 0:
    aux1 = int(d/2)
    aux2 = int(d/2)+1
else:
    aux1 = int(d/2)
    aux2 = aux1
return aux1,aux2
```

## Metodo de minimos cuadrados

```
In [9]: def Med_cuadrados(it, v, d):
lis = []
semilla = int(v)
aux = gP(d)
for i in range(it):
    x= semilla**2
```

```

l= len(str(x))
u= str(x)[int(l/2)-aux[0]:int(l/2)+aux[1]]
r= round(int(i)/10**d,2)

lis.append(r)
semilla=int(u)

return lis

```

In [5]:

```

def lisDict(ngr, au, lis):
    gr = []
    aux=0.00
    for i in range(ngr+1):
        gr.append(round(aux,2))
        aux=aux+au
    a=0
    b=1
    ran={}
    for i in range(len(gr)-1):
        f=gr[a]
        s=gr[b]
        ran.update({str(f)+", "+str(s):[]})
        for i in lis:
            if i==0.00:
                if i >=f and i <=s:
                    ran[str(f)+", "+str(s)].append(i)
            else:
                if i >f and i <=s:
                    ran[str(f)+", "+str(s)].append(i)
        a=b
        b=a+1
    return ran

```

## Chi Cuadrados

In [10]:

```

def chiCuadrado(lis, v):
    num = int(mt.sqrt(len(lis)))
    d = lisDict(num,1/num, lis)
    s = 0.00
    print(" Intervalo ", " Ei ", " Oi ", " (Oi-Ei)**2/Ei")
    for x, it in enumerate(d.items()):
        f = ((len(it[1])-num)**2)/num
        s+=f
        print(x, " ", str(num)+"("+it[0]+") ", len(it[1])," ", f)

    plt.hist(lis)
    plt.ylabel('Frecuencia')
    plt.xlabel('valores')
    plt.title('Chi cuadrado')
    plt.show()

    print("Valor de la Suma : ",s)
    if s < v:
        return True
    else:
        return False

```

In [11]:

```

def main():
    valor = 16.9

```

```

print("Parte 1 CM")
iters = 100
digs = 7
lista = cudMedios(iters, 13747323189, digs)
res=chiCuadrado(lista,valor)
print("Pasa: ",res)

print("")
print("Parte 2 CL")

lista2 = congruel(6,847334897457,13747323189,12,iters)
res2 = chiCuadrado(lista2,valor)
print("Pasa: ",res2)

```

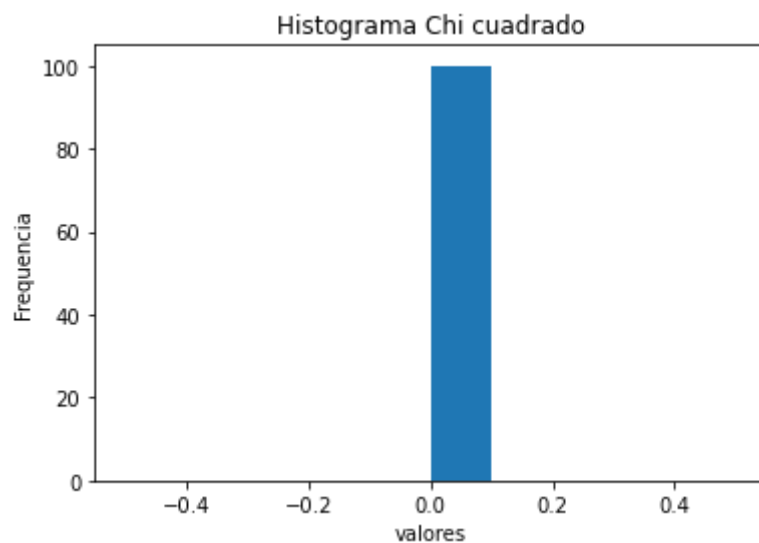
```

In [12]: if __name__ == "__main__":
        main()

```

Parte 1 CM

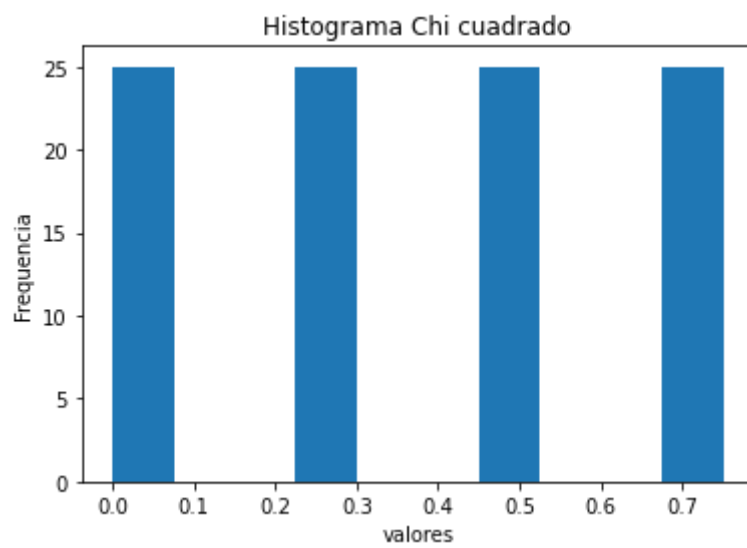
	Intervalo	Ei	Oi	$(O_i - E_i)^2 / E_i$
0	10(0.0,0.1)	100	810.0	
1	10(0.1,0.2)	0	10.0	
2	10(0.2,0.3)	0	10.0	
3	10(0.3,0.4)	0	10.0	
4	10(0.4,0.5)	0	10.0	
5	10(0.5,0.6)	0	10.0	
6	10(0.6,0.7)	0	10.0	
7	10(0.7,0.8)	0	10.0	
8	10(0.8,0.9)	0	10.0	
9	10(0.9,1.0)	0	10.0	



Valor de la Suma : 900.0  
Pasa: False

Parte 2 CL

	Intervalo	Ei	Oi	$(O_i - E_i)^2 / E_i$
0	10(0.0,0.1)	25	22.5	
1	10(0.1,0.2)	0	10.0	
2	10(0.2,0.3)	25	22.5	
3	10(0.3,0.4)	0	10.0	
4	10(0.4,0.5)	25	22.5	
5	10(0.5,0.6)	0	10.0	
6	10(0.6,0.7)	0	10.0	
7	10(0.7,0.8)	25	22.5	
8	10(0.8,0.9)	0	10.0	
9	10(0.9,1.0)	0	10.0	



Valor de la Suma : 150.0  
Pasa: False

In [ ]: