Implementación del Generador de Cuadrados Medios

Cuadrados medios: Xo=74731897457, D=7

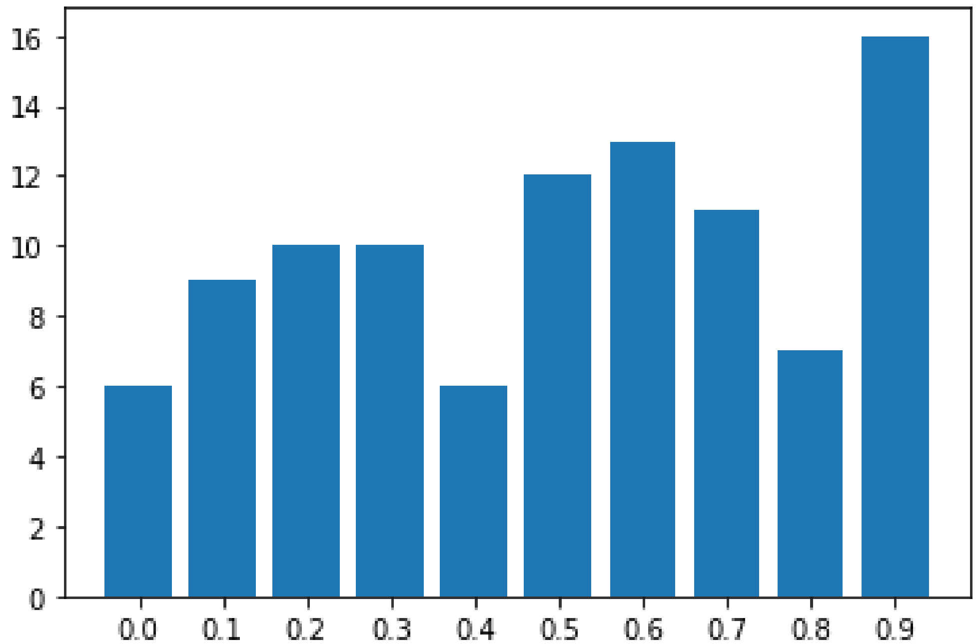
```
# Importanmos las librerias
import random
import matplotlib.pyplot as plt
import numpy as np

numeros = []

def cua_medios():
  xo = int(input("Ingrese la semilla: "))
  digitos = int(input("Ingrese el numero de digitos: "))
  iteraciones = int(input("Ingrese el numero de iteraciones: "))
  xn = xo
  print("It. \t Xn \t Ui \t Rn")
  for i in range(iteraciones):
    xnn = xn**2
    txnn = str(xnn).zfill(8)
    tam = len(txnn)
    ui = int(txnn[int(tam/2-digitos/2):int(tam/2+digitos/2)])
    rn = ui / (int('9'*digitos)+1)
    numeros.append(rn)

    print(str(i) + "\t" + str(xn) + "\t"+ str(ui)+"\t"+str(rn))
    xn = ui

#Defino una funcion para realizar un conteo de los numeros que caen
dentro de cada intervalo
def calcular_chi(numeros):
  tablas = {}
  for i in np.arange(0.1, 1.1, 0.1): # aqui separo en intervalos de
0.1
    for j in numeros:
      if j > i-0.1 and j <= i: # Compruebo si el valor esta dentro del
intervalor
        tablas[round(i-0.1,1)] = tablas[round(i-0.1,1)]+1 if round(i-
0.1,1) in tablas else 1
  return tablas
#defino una funcion para aplicar la formula y obtener la desviacion
estandar de cada intervalo
def sumatoria_chi(tabla, E):
  return sum([(valor-E)**2/E for valor in tabla.values()])
#Defino una funcion para graficar en un cuadro de barras los valores
de cada intervalo
def graficar(tabla):
  plt.bar(range(len(tabla)), list(tabla.values()),
tick_label=list(tabla.keys()))
  plt.show()
```

```python
# Listo eso es todo
cua_medios()
print("Los 100 numeros aleatorios generados")
print(numeros)
print("Tabla de intervalos y el conteo de numeros dentro de cada intervalo")
tablas = calcular_chi(numeros)
print(tablas)
print("Calculamos el valor de chi cuadrado")
print(sumatoria_chi(tablas, 10))
print("Grafica de barras")
graficar(tablas)
```

```
Ingrese la semilla: 74731897457
Ingrese el numero de digitos: 7
Ingrese el numero de iteraciones: 100
It.    Xn    Ui    Rn
0    74731897457     4975235    0.4975235
1    4975235    5296330    0.529633
2    5296330    5111146    0.5111146
3    5111146    2381343    0.2381343
4    2381343    794483     0.0794483
5    794483     1203237    0.1203237
6    1203237    7779278    0.7779278
7    7779278    1716620    0.171662
8    1716620    6784224    0.6784224
9    6784224    2569528    0.2569528
10   2569528    2474142    0.2474142
11   2474142    1378636    0.1378636
12   1378636    637220     0.063722
13   637220     6049328    0.6049328
14   6049328    9436925    0.9436925
15   9436925    5555345    0.5555345
16   5555345    6185806    0.6185806
17   6185806    6419586    0.6419586
18   6419586    1108441    0.1108441
19   1108441    8641450    0.864145
20   8641450    7465810    0.746581
21   7465810    3831895    0.3831895
22   3831895    8341929    0.8341929
23   8341929    8777944    0.8777944
24   8777944    5230086    0.5230086
25   5230086    5379956    0.5379956
26   5379956    4392656    0.4392656
27   4392656    9542673    0.9542673
28   9542673    6260798    0.6260798
29   6260798    9759159    0.9759159
30   9759159    4118438    0.4118438
```

31	4118438	6153155	0.6153155
32	6153155	6131645	0.6131645
33	6131645	9707040	0.970704
34	9707040	2662556	0.2662556
35	2662556	9204453	0.9204453
36	9204453	2195502	0.2195502
37	2195502	229032	0.0229032
38	229032	4556570	0.455657
39	4556570	6233016	0.6233016
40	6233016	5048845	0.5048845
41	5048845	9083583	0.9083583
42	9083583	1148011	0.1148011
43	1148011	7929256	0.7929256
44	7929256	7310071	0.7310071
45	7310071	3713802	0.3713802
46	3713802	9232529	0.9232529
47	9232529	3959173	0.3959173
48	3959173	7505084	0.7505084
49	7505084	2628584	0.2628584
50	2628584	9453845	0.9453845
51	9453845	7518528	0.7518528
52	7518528	2826328	0.2826328
53	2826328	8129963	0.8129963
54	8129963	9629838	0.9629838
55	9629838	3377990	0.337799
56	3377990	1081644	0.1081644
57	1081644	9953742	0.9953742
58	9953742	7697980	0.769798
59	7697980	5889608	0.5889608
60	5889608	8748239	0.8748239
61	8748239	3168560	0.316856
62	3168560	3977247	0.3977247
63	3977247	1849369	0.1849369
64	1849369	165698	0.0165698
65	165698	4558272	0.4558272
66	4558272	7784362	0.7784362
67	7784362	9629174	0.9629174
68	9629174	2099192	0.2099192
69	2099192	6607052	0.6607052
70	6607052	5313613	0.5313613
71	5313613	3448311	0.3448311
72	3448311	9084875	0.9084875
73	9084875	3495376	0.3495376
74	3495376	1765338	0.1765338
75	1765338	6418254	0.6418254
76	6418254	9398440	0.939844
77	9398440	3067443	0.3067443
78	3067443	9206558	0.9206558
79	9206558	6071020	0.607102
80	6071020	5728384	0.5728384

```
81   5728384   1438325   0.1438325
82   1438325   8778805   0.8778805
83   8778805   6741722   0.6741722
84   6741722   5081552   0.5081552
85   5081552   2217072   0.2217072
86   2217072   5408253   0.5408253
87   5408253   4920051   0.4920051
88   4920051   690184    0.0690184
89   690184    6353953   0.6353953
90   6353953   7271872   0.7271872
91   7271872   8012238   0.8012238
92   8012238   9595776   0.9595776
93   9595776   7891704   0.7891704
94   7891704   7899202   0.7899202
95   7899202   9739223   0.9739223
96   9739223   5246464   0.5246464
97   5246464   2538450   0.253845
98   2538450   3728402   0.3728402
99   3728402   98147 0.0098147
Los 100 numeros aleatorios generados
[0.4975235, 0.529633, 0.5111146, 0.2381343, 0.0794483, 0.1203237,
0.7779278, 0.171662, 0.6784224, 0.2569528, 0.2474142, 0.1378636,
0.063722, 0.6049328, 0.9436925, 0.5555345, 0.6185806, 0.6419586,
0.1108441, 0.864145, 0.746581, 0.3831895, 0.8341929, 0.8777944,
0.5230086, 0.5379956, 0.4392656, 0.9542673, 0.6260798, 0.9759159,
0.4118438, 0.6153155, 0.6131645, 0.970704, 0.2662556, 0.9204453,
0.2195502, 0.0229032, 0.455657, 0.6233016, 0.5048845, 0.9083583,
0.1148011, 0.7929256, 0.7310071, 0.3713802, 0.9232529, 0.3959173,
0.7505084, 0.2628584, 0.9453845, 0.7518528, 0.2826328, 0.8129963,
0.9629838, 0.337799, 0.1081644, 0.9953742, 0.769798, 0.5889608,
0.8748239, 0.316856, 0.3977247, 0.1849369, 0.0165698, 0.4558272,
0.7784362, 0.9629174, 0.2099192, 0.6607052, 0.5313613, 0.3448311,
0.9084875, 0.3495376, 0.1765338, 0.6418254, 0.939844, 0.3067443,
0.9206558, 0.607102, 0.5728384, 0.1438325, 0.8778805, 0.6741722,
0.5081552, 0.2217072, 0.5408253, 0.4920051, 0.0690184, 0.6353953,
0.7271872, 0.8012238, 0.9595776, 0.7891704, 0.7899202, 0.9739223,
0.5246464, 0.253845, 0.3728402, 0.0098147]
Tabla de intervalos y el conteo de numeros dentro de cada intervalo
{0.0: 6, 0.1: 9, 0.2: 10, 0.3: 10, 0.4: 6, 0.5: 12, 0.6: 13, 0.7: 11,
0.8: 7, 0.9: 16}
Calculamos el valor de chi cuadrado
9.200000000000001
Grafica de barras
```



Implementación de Congruencia Lineal

Congruencia lineal: a=74731897457, b=37747318974, Xo=7, M=19

```
numeros = []

def con_lineas():
  xo = int(input("Ingrese la semilla: "))
  a = int(input("Ingrese el valor a: "))
  b = int(input("Ingrese el valor b: "))
  m = int(input("Ingrese el valor m: "))
  iteraciones = int(input("Ingrese el numero de iteraciones: "))
  xn = xo
  print("It. \t Xn \t Ui")
  for i in range(iteraciones):
    xnn = (a*xn+b) % m
    ui = xnn/m
    numeros.append(ui)
    print(str(i) + "\t"+ str(xnn)+"\t"+str(ui))
    xn = xnn

#Defino una funcion para realizar un conteo de los numeros que caen
dentro de cada intervalo
def calcular_chi(numeros):
  tablas = {}
  for i in np.arange(0.1, 1.1, 0.1): # aqui separo en intervalos de
0.1
    for j in numeros:
      if j > i-0.1 and j <= i: # Compruebo si el valor esta dentro del
intervalor
```

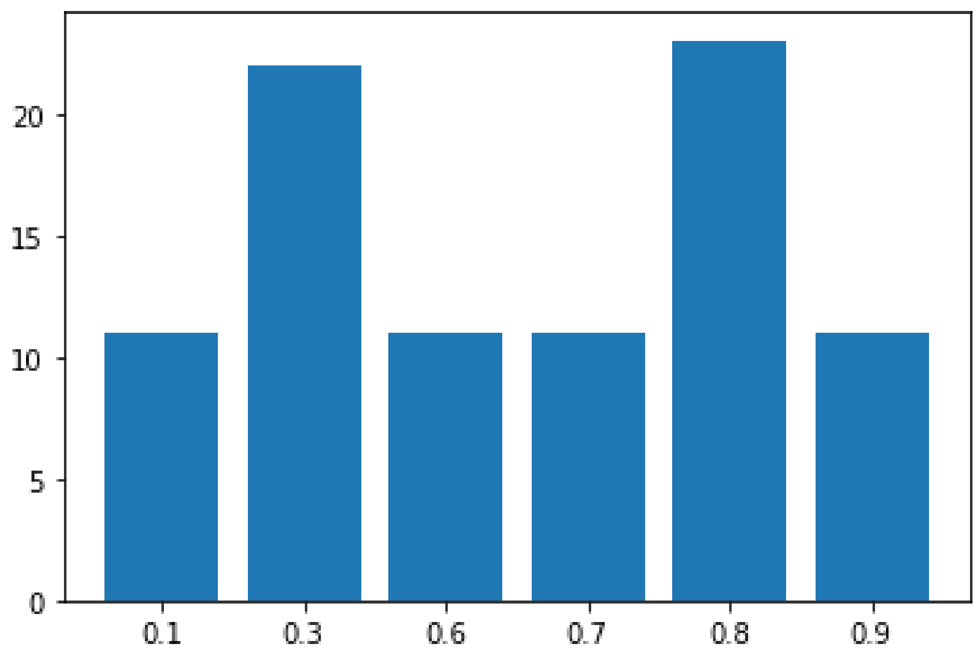
```
        tablas[round(i-0.1,1)] = tablas[round(i-0.1,1)]+1 if round(i-
0.1,1) in tablas else 1
  return tablas
#defino una funcion para aplicar la formula y obtener la desviacion
estandar de cada intervalo
def sumatoria_chi(tabla, E):
  return sum([(valor-E)**2/E for valor in tabla.values()])
#Defino una funcion para graficar en un cuadro de barras los valores
de cada intervalo
def graficar(tabla):
  plt.bar(range(len(tabla)), list(tabla.values()),
tick_label=list(tabla.keys()))
  plt.show()
# Listo eso es todo
con_lineas()
print("Los 100 numeros aleatorios generados")
print(numeros)
print("Tabla de intervalos y el conteo de numeros dentro de cada
intervalo")
tablas = calcular_chi(numeros)
print(tablas)
print("Calculamos el valor de chi cuadrado")
print(sumatoria_chi(tablas, 10))
print("Grafica de barras")
graficar(tablas)
```

```
Ingrese la semilla: 7
Ingrese el valor a: 74731897457
Ingrese el valor b: 37747318974
Ingrese el valor m: 19
Ingrese el numero de iteraciones: 100
It.    Xn    Ui
0     17    0.8947368421052632
1     16    0.8421052631578947
2     18    0.9473684210526315
3     14    0.7368421052631579
4     3     0.15789473684210525
5     6     0.3157894736842105
6     0     0.0
7     12    0.631578947368421
8     7     0.3684210526315789
9     17    0.8947368421052632
10    16    0.8421052631578947
11    18    0.9473684210526315
12    14    0.7368421052631579
13    3     0.15789473684210525
14    6     0.3157894736842105
15    0     0.0
16    12    0.631578947368421
```

17	7	0.3684210526315789
18	17	0.8947368421052632
19	16	0.8421052631578947
20	18	0.9473684210526315
21	14	0.7368421052631579
22	3	0.15789473684210525
23	6	0.3157894736842105
24	0	0.0
25	12	0.631578947368421
26	7	0.3684210526315789
27	17	0.8947368421052632
28	16	0.8421052631578947
29	18	0.9473684210526315
30	14	0.7368421052631579
31	3	0.15789473684210525
32	6	0.3157894736842105
33	0	0.0
34	12	0.631578947368421
35	7	0.3684210526315789
36	17	0.8947368421052632
37	16	0.8421052631578947
38	18	0.9473684210526315
39	14	0.7368421052631579
40	3	0.15789473684210525
41	6	0.3157894736842105
42	0	0.0
43	12	0.631578947368421
44	7	0.3684210526315789
45	17	0.8947368421052632
46	16	0.8421052631578947
47	18	0.9473684210526315
48	14	0.7368421052631579
49	3	0.15789473684210525
50	6	0.3157894736842105
51	0	0.0
52	12	0.631578947368421
53	7	0.3684210526315789
54	17	0.8947368421052632
55	16	0.8421052631578947
56	18	0.9473684210526315
57	14	0.7368421052631579
58	3	0.15789473684210525
59	6	0.3157894736842105
60	0	0.0
61	12	0.631578947368421
62	7	0.3684210526315789
63	17	0.8947368421052632
64	16	0.8421052631578947
65	18	0.9473684210526315
66	14	0.7368421052631579

```
67   3    0.15789473684210525
68   6    0.3157894736842105
69   0    0.0
70   12   0.631578947368421
71   7    0.3684210526315789
72   17   0.8947368421052632
73   16   0.8421052631578947
74   18   0.9473684210526315
75   14   0.7368421052631579
76   3    0.15789473684210525
77   6    0.3157894736842105
78   0    0.0
79   12   0.631578947368421
80   7    0.3684210526315789
81   17   0.8947368421052632
82   16   0.8421052631578947
83   18   0.9473684210526315
84   14   0.7368421052631579
85   3    0.15789473684210525
86   6    0.3157894736842105
87   0    0.0
88   12   0.631578947368421
89   7    0.3684210526315789
90   17   0.8947368421052632
91   16   0.8421052631578947
92   18   0.9473684210526315
93   14   0.7368421052631579
94   3    0.15789473684210525
95   6    0.3157894736842105
96   0    0.0
97   12   0.631578947368421
98   7    0.3684210526315789
99   17   0.8947368421052632
Los 100 numeros aleatorios generados
[0.8947368421052632, 0.8421052631578947, 0.9473684210526315,
0.7368421052631579, 0.15789473684210525, 0.3157894736842105, 0.0,
0.631578947368421, 0.3684210526315789, 0.8947368421052632,
0.8421052631578947, 0.9473684210526315, 0.7368421052631579,
0.15789473684210525, 0.3157894736842105, 0.0, 0.631578947368421,
0.3684210526315789, 0.8947368421052632, 0.8421052631578947,
0.9473684210526315, 0.7368421052631579, 0.15789473684210525,
0.3157894736842105, 0.0, 0.631578947368421, 0.3684210526315789,
0.8947368421052632, 0.8421052631578947, 0.9473684210526315,
0.7368421052631579, 0.15789473684210525, 0.3157894736842105, 0.0,
0.631578947368421, 0.3684210526315789, 0.8947368421052632,
0.8421052631578947, 0.9473684210526315, 0.7368421052631579,
0.15789473684210525, 0.3157894736842105, 0.0, 0.631578947368421,
0.3684210526315789, 0.8947368421052632, 0.8421052631578947,
0.9473684210526315, 0.7368421052631579, 0.15789473684210525,
0.3157894736842105, 0.0, 0.631578947368421, 0.3684210526315789,
```

```
0.8947368421052632, 0.8421052631578947, 0.9473684210526315,
0.7368421052631579, 0.15789473684210525, 0.3157894736842105, 0.0,
0.631578947368421, 0.3684210526315789, 0.8947368421052632,
0.8421052631578947, 0.9473684210526315, 0.7368421052631579,
0.15789473684210525, 0.3157894736842105, 0.0, 0.631578947368421,
0.3684210526315789, 0.8947368421052632, 0.8421052631578947,
0.9473684210526315, 0.7368421052631579, 0.15789473684210525,
0.3157894736842105, 0.0, 0.631578947368421, 0.3684210526315789,
0.8947368421052632, 0.8421052631578947, 0.9473684210526315,
0.7368421052631579, 0.15789473684210525, 0.3157894736842105, 0.0,
0.631578947368421, 0.3684210526315789, 0.8947368421052632,
0.8421052631578947, 0.9473684210526315, 0.7368421052631579,
0.15789473684210525, 0.3157894736842105, 0.0, 0.631578947368421,
0.3684210526315789, 0.8947368421052632]
Tabla de intervalos y el conteo de numeros dentro de cada intervalo
{0.1: 11, 0.3: 22, 0.6: 11, 0.7: 11, 0.8: 23, 0.9: 11}
Calculamos el valor de chi cuadrado
31.7
Grafica de barras
```



Tauswoth q=7, r=3, l=5

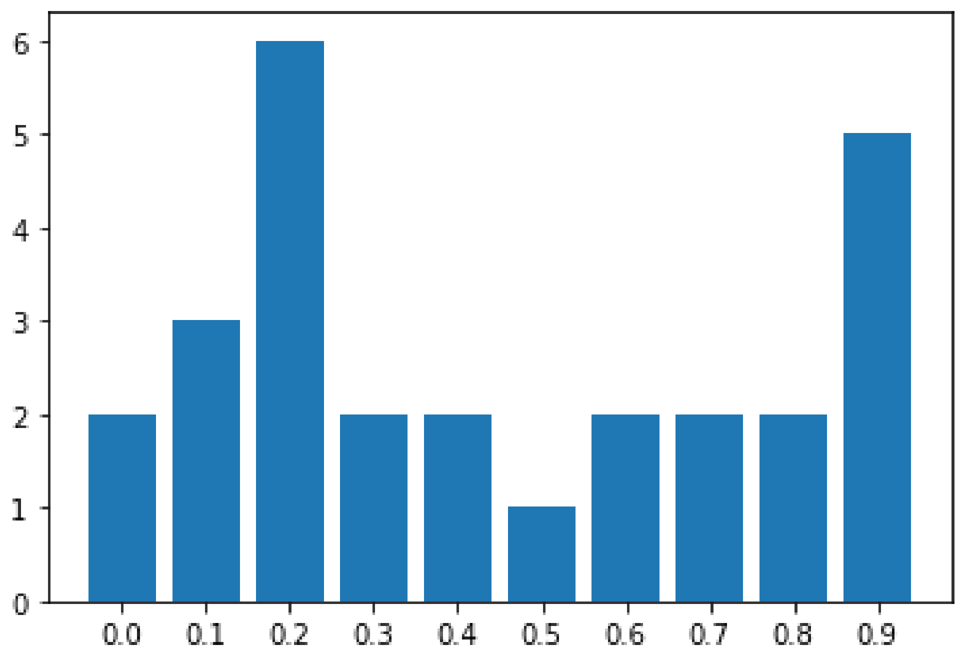
```python
numeros = []

def cal_Tausworthe():

  #Generador Tausworthe
  # secuencia como list, tuple, str, etc.
  from itertools import zip_longest
  r = int(input("valor de r: "))
```

```
  q = int(input("valor de q: "))
  binarios = int(input("Digite el valor de la base: "))
  def operacionXOR(a,b):
    ab = 1
    if a  == b:
      ab = 0
    return ab
  bits = []
  b = (2**q) - 1
  for i in range(0,b):
    bits.append(0)
  print(bits)
  for i in range(0,q):
    bits[i] = 1
    bits.append(1)
  print(bits)
  a = q+1
  for i in range(a,len(bits)):
    i1 = i - r
    i2 = i - q
    bits[i] = operacionXOR(bits[i1],bits[i2])
  print(bits)
  def binarioADecimal(binario):
    a = 0
    p = (binarios-1)
    for i in range(0,len(binario)):
      if binario[i] == 1:
        a += 2**(p-i)
    return a
  test_list = bits
  def elementos(n, iterable, padvalue='1'):

    return zip_longest(*[iter(iterable)]*n, fillvalue=padvalue)
  print("\n","It.", "\t", "Base 2", "\t","Base 10","\t","Ui","\n")
  d = 0
  for output in elementos(binarios,test_list):
      lst_new = [str(a) for a in output]
      print(d,"\t" ," ".join(lst_new), "\t", binarioADecimal(output),
"\
  t", "\t", binarioADecimal(output)/(2**binarios))
      d +=1
      numeros.append(binarioADecimal(output)/(2**binarios))

#Defino una funcion para realizar un conteo de los numeros que caen
dentro de cada intervalo
def calcular_chi(numeros):
  tablas = {}
  for i in np.arange(0.1, 1.1, 0.1): # aqui separo en intervalos de
0.1
    for j in numeros:
```

```
      if j > i-0.1 and j <= i: # Compruebo si el valor esta dentro del
intervalor
        tablas[round(i-0.1,1)] = tablas[round(i-0.1,1)]+1 if round(i-
0.1,1) in tablas else 1
  return tablas
#defino una funcion para aplicar la formula y obtener la desviacion
estandar de cada intervalo
def sumatoria_chi(tabla, E):
  return sum([(valor-E)**2/E for valor in tabla.values()])
#Defino una funcion para graficar en un cuadro de barras los valores
de cada intervalo
def graficar(tabla):
  plt.bar(range(len(tabla)), list(tabla.values()),
tick_label=list(tabla.keys()))
  plt.show()
# Listo eso es todo
cal_Tausworthe()
print("Los 100 numeros aleatorios generados")
print(numeros)
print("Tabla de intervalos y el conteo de numeros dentro de cada
intervalo")
tablas = calcular_chi(numeros)
print(tablas)
print("Calculamos el valor de chi cuadrado")
print(sumatoria_chi(tablas, 10))
print("Grafica de barras")
graficar(tablas)
```

```
valor de r: 3
valor de q: 7
Digite el valor de la base: 5
[0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0]
[1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1]
[1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0,
0, 1, 0, 1, 1, 1, 1, 1, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 1, 0, 1, 1, 0,
1, 1, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 0, 1, 0, 1, 1, 0, 0, 1, 1, 0, 0,
0, 0, 0, 1, 1, 0, 1, 1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0,
1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 1, 0, 0,
```

```
1, 1, 1, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1]

 It.   Base 2     Base 10    Ui

0      1 1 1 1 1       31   t     0.96875
1      1 1 0 0 0       24   t     0.75
2      1 1 1 0 1       29   t     0.90625
3      1 0 0 0 1       17   t     0.53125
4      0 1 0 0 1       9   t      0.28125
5      0 1 1 1 1       15   t     0.46875
6      1 0 1 0 1       21   t     0.65625
7      0 1 0 0 0       8   t      0.25
8      0 1 0 1 1       11   t     0.34375
9      0 1 1 1 1       15   t     0.46875
10     0 0 1 1 1       7   t      0.21875
11     0 0 1 0 1       5   t      0.15625
12     0 1 1 0 0       12   t     0.375
13     1 1 0 0 0       24   t     0.75
14     0 0 1 1 0       6   t      0.1875
15     1 1 0 1 0       26   t     0.8125
16     1 1 1 0 1       29   t     0.90625
17     0 0 0 1 1       3   t      0.09375
18     0 0 1 0 0       4   t      0.125
19     0 1 0 0 0       8   t      0.25
20     0 0 0 1 0       2   t      0.0625
21     0 1 0 0 1       9   t      0.28125
22     1 0 1 0 0       20   t     0.625
23     1 1 1 1 0       30   t     0.9375
24     1 1 1 0 0       28   t     0.875
25     0 0 1 1 1       7   t      0.21875
26     1 1 1 1 1       30   t     0.9375
Los 100 numeros aleatorios generados
[0.96875, 0.75, 0.90625, 0.53125, 0.28125, 0.46875, 0.65625, 0.25,
0.34375, 0.46875, 0.21875, 0.15625, 0.375, 0.75, 0.1875, 0.8125,
0.90625, 0.09375, 0.125, 0.25, 0.0625, 0.28125, 0.625, 0.9375, 0.875,
0.21875, 0.9375]
Tabla de intervalos y el conteo de numeros dentro de cada intervalo
{0.0: 2, 0.1: 3, 0.2: 6, 0.3: 2, 0.4: 2, 0.5: 1, 0.6: 2, 0.7: 2, 0.8:
2, 0.9: 5}
Calculamos el valor de chi cuadrado
55.5
Grafica de barras
```



Random de Python semilla (11052022)

```
#Defino una funcion para generar los 100 numeros pseudoaletaroios,
#en este caso estoy utilizando la libreria de Python random
def random_python(N=100):
  numeros = []
  random.seed(11052022)
  [numeros.append(random.random())for i in range(N)]
  return numeros

#Defino una funcion para realizar un conteo de los numeros que caen
dentro de cada intervalo
def calcular_chi(numeros):
  tablas = {}
  for i in np.arange(0.1, 1.1, 0.1): # aqui separo en intervalos de
0.1
    for j in numeros:
      if j > i-0.1 and j <= i: # Compruebo si el valor esta dentro del
intervalor
        tablas[round(i-0.1,1)] = tablas[round(i-0.1,1)]+1 if round(i-
0.1,1) in tablas else 1
  return tablas
#defino una funcion para aplicar la formula y obtener la desviacion
estandar de cada intervalo
def sumatoria_chi(tabla, E):
  return sum([(valor-E)**2/E for valor in tabla.values()])
#Defino una funcion para graficar en un cuadro de barras los valores
de cada intervalo
def graficar(tabla):
  plt.bar(range(len(tabla)), list(tabla.values()),
```

```python
tick_label=list(tabla.keys()))
  plt.show()
# Listo eso es todo
numeros = random_python()
print("Los 100 numeros aleatorios generados")
print(numeros)
print("Tabla de intervalos y el conteo de numeros dentro de cada
intervalo")
tablas = calcular_chi(numeros)
print(tablas)
print("Calculamos el valor de chi cuadrado")
print(sumatoria_chi(tablas, 10))
print("Grafica de barras")
graficar(tablas)
```

```
Los 100 numeros aleatorios generados
[0.39122091339712006, 0.08673940245642964, 0.9233776991044218,
0.5643281259214213, 0.5018754578724773, 0.6092906311578306,
0.7944410154604006, 0.4745506456495402, 0.3496767363331855,
0.08044631797968471, 0.6263578731542199, 0.2036014039706825,
0.32266209276724567, 0.1789720571675194, 0.51299029248829,
0.7770010208223913, 0.5449750015006763, 0.6965377945580097,
0.17325150202955186, 0.9000269906696816, 0.7996854776854797,
0.35322968565101953, 0.6711727475466924, 0.28345737390743064,
0.37350518006964006, 0.37916716408773543, 0.17048123118844705,
0.823379948568777, 0.22300266321497408, 0.051569135814649614,
0.1922950198508785, 0.8634191905130083, 0.5439027360115081,
0.12556216958312505, 0.34124337838965746, 0.6811002910449016,
0.07304203459633685, 0.12499764479557629, 0.2036691179102461,
0.5579574657844889, 0.7421399105045708, 0.5911979676257648,
0.985890474077214, 0.36352070742615483, 0.8983386409438613,
0.045274687387145685, 0.010854410020205485, 0.10747868006965788,
0.7310662267223154, 0.6789110128701332, 0.4681284220423234,
0.7487069922157717, 0.04797854000306567, 0.24710709969259748,
0.04930411236665988, 0.0020391251798350662, 0.07593976703716421,
0.28676974817745593, 0.0046998045473188865, 0.994987409240566,
0.9826228155176063, 0.6053241326585376, 0.5849806144858605,
0.22958414513776948, 0.10777536071052607, 0.5808351957143609,
0.572388670521242, 0.008221646874923993, 0.6896864689831648,
0.12846169495459336, 0.2535791939191787, 0.5478308529147088,
0.27120576132569874, 0.7256050877837473, 0.010751622315348097,
0.9426507923902242, 0.715282633312101, 0.5199730077235968,
0.17428944191844298, 0.8915547498465177, 0.24393711031568588,
0.018682015068336, 0.8427798991994951, 0.015499748889723719,
0.7895388047965864, 0.5450205028827372, 0.2964689443835594,
0.577139092833342, 0.3904078855024612, 0.8461885527273011,
0.2598106883020571, 0.3421468366012045, 0.8909448186747102,
0.16447232820424518, 0.20528958200149916, 0.9877596907709568,
0.27006525861806896, 0.5219510602287093, 0.5592011764902934,
0.5556146311555469]
```

```
Tabla de intervalos y el conteo de numeros dentro de cada intervalo
{0.0: 15, 0.1: 11, 0.2: 14, 0.3: 10, 0.4: 2, 0.5: 17, 0.6: 8, 0.7: 9,
0.8: 7, 0.9: 7}
Calculamos el valor de chi cuadrado
17.8
Grafica de barras
```