Prueba Numero PseudoAleatorios

Nicolas Añazco

In [29]:
```
#Importacion de las librerias a utilizar
import numpy as np
import math as mt
import matplotlib.pyplot as plt
```

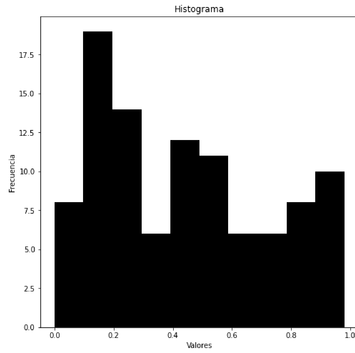
In [30]:
```
def congruencias_lin(a,b,c,m,iteraciones):
    lista=[]
    for i in range(iteraciones):
        a = (a*b+c) % m
        lista.append(round(a/m,2))
    return lista

def getPosicion(digitos):
    valor1 = 0
    valor2 = 0
    if digitos%2 !=0:
        valor1 = int(digitos/2)
        valor2 = int(digitos/2)+1
    else:
        valor1 = int(digitos/2)
        valor2 = valor1
    return valor1,valor2


def cuadradosMedios(iteraciones,v,digitos):
    sm = int(v)
    lista=[]
    m = getPosicion(digitos)
    for i in range(iteraciones):
        n = sm**2
        long = len(str(n))
        u_i = str(n)[int(long/2)-m[0]:int(long/2)+m[1]]
        #print(u_i)
        lista.append(round(int(u_i)/10**digitos,2))
        sm = int(u_i)
    return lista
```

In [32]:
```
def get_list(n_gr,aum,lista):
    var = 0
    g = []
    ran = n_gr+1
    num1 = 0
    num2 = 1
    rgs = {}
    for i in range(ran):
        g.append(round(var,2))
        var = var+aum

    ran2 = len(g)-1
    for i in range(ran2):
        f = g[num1]
        s = g[num2]
        rgs.update({str(f)+","+str(s):[]})
        for i in lista:
            if i!= 0:
                if i >f and i <=s:
                    rgs[str(f)+","+str(s)].append(i)
            else:
                if i >=f and i <=s:
                    rgs[str(f)+","+str(s)].append(i)
        num1=num2
        num2=num1+1
    return rgs


def metodo_chi(lista,v):
    n_gr = int(mt.sqrt(len(lista)))
    aum = 1/n_gr
    sumatoria = 0
    band = get_list(n_gr,aum,lista)
    print(" Intervalo: ", "      Ei: ", "       Oi: ", " (Oi-Ei)^2/Ei:")
    for i, itr in enumerate(band.items()):
        operacion = ((len(itr[1])-n_gr)**2)/n_gr
        sumatoria+= operacion
        txt = itr[0].split(',')
        print(i, "          ", str(n_gr)+"("+txt[0]+"-"+txt[1]+")
", len(itr[1]),"     ", operacion)

    plt.figure(figsize=(8,8),facecolor='white',edgecolor='yellow')
    plt.hist(lista,color='black')
    plt.ylabel('Frecuencia')
    plt.xlabel('Valores')
    plt.title('Histograma')
    plt.show()
    print("--------------------")
    print("Suma: ", sumatoria)
    if sumatoria < v:
        return True
    else:
        return False
```

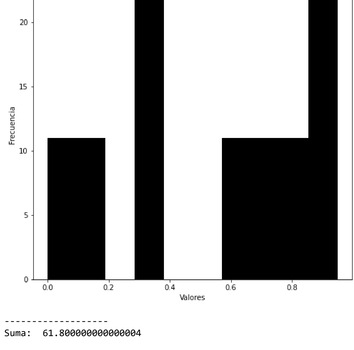
Ejecucion del Algoritmo

In [33]:
```
if __name__ == "__main__":
    iteraciones = 100
    v_obtenido= 16.9
    D = 7
    Xo = 74731897457
    b = 37747318974
    M = 19

    print("Parte 1")
    lista = cuadradosMedios(iteraciones, Xo, 7)
    res=metodo_chi(lista,v_obtenido)
    print("")
    print("Parte 2")
    lista2 = congruencias_lin(D,Xo,b,M,iteraciones)
    res2 = metodo_chi(lista2,v_obtenido)
```

```
Parte 1
 Intervalo:        Ei:         Oi:   (Oi-Ei)^2/Ei:
0              10(0-0.1)       11        0.1
1              10(0.1-0.2)     18        6.4
2              10(0.2-0.3)     12        0.4
3              10(0.3-0.4)     7         0.9
4              10(0.4-0.5)     13        0.9
5              10(0.5-0.6)     9         0.1
6              10(0.6-0.7)     7         0.9
7              10(0.7-0.8)     5         2.5
8              10(0.8-0.9)     8         0.4
9              10(0.9-1.0)     10        0.0
```




```
--------------------
Suma:  12.600000000000001

Parte 2
 Intervalo:        Ei:         Oi:   (Oi-Ei)^2/Ei:
0              10(0-0.1)       11        0.1
1              10(0.1-0.2)     11        0.1
2              10(0.2-0.3)     0        10.0
3              10(0.3-0.4)     22       14.4
4              10(0.4-0.5)     0        10.0
5              10(0.5-0.6)     0        10.0
6              10(0.6-0.7)     11        0.1
7              10(0.7-0.8)     11        0.1
8              10(0.8-0.9)     23       16.9
9              10(0.9-1.0)     11        0.1
```




```
--------------------
Suma:  61.800000000000004
```