In [1]:

```
def fsigno(x):
  if x>0:
    return 1
  else:
    return -1
```

In [2]:

```
n = 0.5 #tasa de aprendizaje
```

In [6]:

```
import random
random.seed(50)
w1 = random.random()
w2 = random.random()
s  = random.random() #sesgo: peso del bias
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  0.4975365687586023
w2 =  0.2661737230725406
sesgo =  0.6374111614436909
```

In [7]:

```
x1 = 1
x2 = 1
z = 1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
1.401121453274834
y = 1
```

In [8]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  0.4975365687586023
w2 =  0.2661737230725406
sesgo =  0.6374111614436909
```

In [9]:

```
x1 = 1
x2 = -1
z = -1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
0.8687740071297526
y = 1
```

In [10]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  -0.5024634312413977
w2 =  1.2661737230725407
sesgo =  -0.3625888385563091
```

In [11]:

```
x1 = - 1
x2 = 1
z = -1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
1.4060483157576296
y = 1
```

In [12]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  0.4975365687586023
w2 =  0.2661737230725407
sesgo =  -1.362588838556309
```

In [13]:

```
x1 = - 1
x2 = - 1
z = -1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
-2.126299130387452
y = -1
```

In [14]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  0.4975365687586023
w2 =  0.2661737230725407
sesgo =  -1.362588838556309
```

#Nueva Época (Época 2)

In [15]:

```
x1 = 1
x2 = 1
z = 1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
-0.5988785467251659
y = -1
```

In [16]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  1.4975365687586022
w2 =  1.2661737230725407
sesgo =  -0.36258883855630897
```

In [17]:

```
x1 = 1
x2 = -1
z = -1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
-0.1312259928702475
y = -1
```

In [18]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  1.4975365687586022
w2 =  1.2661737230725407
sesgo =  -0.36258883855630897
```

In [19]:

```
x1 = - 1
x2 =  1
z = -1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
-0.5939516842423704
y = -1
```

In [20]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  1.4975365687586022
w2 =  1.2661737230725407
sesgo =  -0.36258883855630897
```

In [21]:

```
x1 = - 1
x2 = - 1
z = - 1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
-3.126299130387452
y = -1
```

In [22]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  1.4975365687586022
w2 =  1.2661737230725407
sesgo =  -0.36258883855630897
```

Fin de la Época 2

Época 3

In [23]:

```
x1 = 1
x2 = 1
z = 1
print(x1*w1 + x2*w2 + 1*s)
y = fsigno(x1*w1 + x2*w2 + 1*s)
print("y =", y)
```

```
2.401121453274834
y = 1
```

In [24]:

```
w1 = w1 + n*(z-y)*x1
w2 = w2 + n*(z-y)*x2
s = s + n*(z-y)*1
print("w1 = ", w1)
print("w2 = ",w2)
print("sesgo = ",s)
```

```
w1 =  1.4975365687586022
w2 =  1.2661737230725407
sesgo =  -0.36258883855630897
```

Ya no hay más cambios. No es necesario probar con el resto de entradas de la época porque ya han sido probados satisfactoriamente con los mismos pesos.

In [25]:

```
def funcionAnd(x1 , x2):
  y = fsigno (x1*1.4975365687586022 + x2*1.2661737230725407 + 1*(-0.36258883855630897))
  if y == 1:
    return "V"
  else:
    return "F"
```

In [26]:

```
#Prueba
print("V and V: ",funcionAnd(1,1))
print("V and F: ",funcionAnd(1,-1))
print("F and V: ",funcionAnd(-1,1))
print("F and F: ",funcionAnd(-1,-1))
```

```
V and V:  V
V and F:  F
F and V:  F
F and F:  F
```