

In [5]:

```
import numpy as np
import pandas as pd
```

```
a = [0, 0, 1, 1]
b = [0, 1, 0, 1]
y = [0, 0, 0, 1]
```

```
t1 = 0.3
t2 = -0.1
```

```
n = 0.1
Th = 0.2
```

In [7]:

```
for i in range(5):
    print('-'*79)
    print(' '*35, 'epoch:', i+1)
    print('-'*79)
    error = []
    temp = []
    for j in range(len(a)):
        h = np.dot(a[j], t1) + np.dot(b[j], t2)

        if h < Th:
            h = 0
        else:
            h = 1
        cost = y[j] - h
        temp.append(h)
        error.append(cost)
        if temp == y:

            print('input:', a[j], b[j], 'output:', y[j],
                  'old weight:', t1_temp, t2_temp, 'output: ', h,
                  'cost:', cost, 'new weight:', t1, t2)
            break
    else:
        t1_temp = t1
        t1 = t1 + n * a[j] * cost
        t1 = float("{0:.2f}".format(t1))

        t2_temp = t2
        t2 = t2 + n * b[j] * cost
        t2 = float("{0:.2f}".format(t2))

        print('input:', a[j], b[j], 'output:', y[j],
              'old weight:', t1_temp, t2_temp, 'output: ', h,
              'cost:', cost, 'new weight:', t1, t2)
```

-----  
epoch: 1  
-----

input: 0 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1  
0.1  
input: 0 1 output: 0 old weight: 0 1 0 1 output: 0 cost: 0 new weight: 0 1

```
input: 0 1 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 1 output: 1 old weight: 0.1 0.1 output: 1 cost: 0 new weight: 0.1
0.1
```

-----  
epoch: 2  
-----

```
input: 0 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 0 1 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 1 output: 1 old weight: 0.1 0.1 output: 1 cost: 0 new weight: 0.1
0.1
```

-----  
epoch: 3  
-----

```
input: 0 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 0 1 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 1 output: 1 old weight: 0.1 0.1 output: 1 cost: 0 new weight: 0.1
0.1
```

-----  
epoch: 4  
-----

```
input: 0 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 0 1 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 1 output: 1 old weight: 0.1 0.1 output: 1 cost: 0 new weight: 0.1
0.1
```

-----  
epoch: 5  
-----

```
input: 0 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 0 1 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 0 output: 0 old weight: 0.1 0.1 output: 0 cost: 0 new weight: 0.1
0.1
input: 1 1 output: 1 old weight: 0.1 0.1 output: 1 cost: 0 new weight: 0.1
0.1
```

