

EX 4

CODING:

```
import math,random

X=[[0,0],[0,1],[1,0],[1,1]]
Y=[0,1,1,0]

sig=lambda x:1/(1+math.exp(-x))
ds=lambda y:y*(1-y)

w=[random.random() for _ in range(6)]
lr=0.5

for _ in range(8000):
    for x,y in zip(X,Y):
        h1=sig(x[0]*w[0]+x[1]*w[1])
        h2=sig(x[0]*w[2]+x[1]*w[3])
        o=sig(h1*w[4]+h2*w[5])
        e=y-o
        w[4]+=lr*e*ds(o)*h1
        w[5]+=lr*e*ds(o)*h2
        w[0]+=lr*e*ds(o)*w[4]*ds(h1)*x[0]
        w[1]+=lr*e*ds(o)*w[4]*ds(h1)*x[1]
        w[2]+=lr*e*ds(o)*w[5]*ds(h2)*x[0]
        w[3]+=lr*e*ds(o)*w[5]*ds(h2)*x[1]

for x in X:
    h1=sig(x[0]*w[0]+x[1]*w[1])
    h2=sig(x[0]*w[2]+x[1]*w[3])
    print(x,"->",round(sig(h1*w[4]+h2*w[5])))
```

OUTPUT:

main.py	Output
<pre>1 import math, random 2 3 X=[[0,0],[0,1],[1,0],[1,1]] 4 Y=[0,1,1,0] 5 6 sig=lambda x:1/(1+math.exp(-x)) 7 ds=lambda y:y*(1-y) 8 9 w=[random.random() for _ in range(6)] 10 lr=0.5 11 12 for _ in range(8000): 13 for x,y in zip(X,Y): 14 h1=sig(x[0]*w[0]+x[1]*w[1]) 15 h2=sig(x[0]*w[2]+x[1]*w[3]) 16 o=sig(h1*w[4]+h2*w[5]) 17 e=y-o 18 w[4]+=lr*e*ds(o)*h1; w[5]+=lr*e*ds(o)*h2 19 w[0]+=lr*e*ds(o)*w[4]*ds(h1)*x[0] 20 w[1]+=lr*e*ds(o)*w[4]*ds(h1)*x[1] 21 w[2]+=lr*e*ds(o)*w[5]*ds(h2)*x[0] 22 w[3]+=lr*e*ds(o)*w[5]*ds(h2)*x[1] 23 24 for x in X: 25 h1=sig(x[0]*w[0]+x[1]*w[1]) 26 h2=sig(x[0]*w[2]+x[1]*w[3]) 27 print(x,"->",round(sig(h1*w[4]+h2*w[5]))) 28</pre>	<pre>[0, 0] -> 0 [0, 1] -> 1 [1, 0] -> 1 [1, 1] -> 0 === Code Execution Successful ===</pre>