

```
import math, random
```

```
def s(x):
```

```
    return 1/(1+math.exp(-x))
```

```
def ds(y):
```

```
    return y*(1-y)
```

```
X=[[0,0],[0,1],[1,0],[1,1]]
```

```
Y=[0,1,1,0]
```

```
w1=[[random.random(),random.random()],[random.random(),random.random()]]
```

```
w2=[random.random(),random.random()]
```

```
b1=[random.random(),random.random()]
```

```
b2=random.random()
```

```
lr=0.5
```

```
for _ in range(5000):
```

```
    for x,y in zip(X,Y):
```

```
        h=[s(x[0]*w1[0][i]+x[1]*w1[1][i]+b1[i]) for i in range(2)]
```

```
        o=s(h[0]*w2[0]+h[1]*w2[1]+b2)
```

```
        d_o=(y-o)*ds(o)
```

```
        d_h=[d_o*w2[i]*ds(h[i]) for i in range(2)]
```

```
        for i in range(2):
```

```
            w2[i]+=lr*d_o*h[i]
```

```
            w1[0][i]+=lr*d_h[i]*x[0]
```

```
            w1[1][i]+=lr*d_h[i]*x[1]
```

```
            b1[i]+=lr*d_h[i]
```

```
        b2+=lr*d_o
```

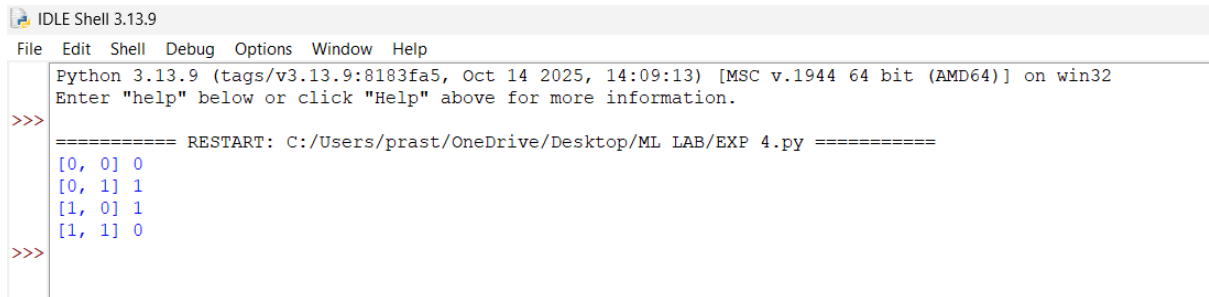
for x in X:

h=[s(x[0]\*w1[0][i]+x[1]\*w1[1][i]+b1[i]) for i in range(2)]

o=s(h[0]\*w2[0]+h[1]\*w2[1]+b2)

print(x,round(o))

OUTPUT:



```
IDLE Shell 3.13.9
File Edit Shell Debug Options Window Help
Python 3.13.9 (tags/v3.13.9:8183fa5, Oct 14 2025, 14:09:13) [MSC v.1944 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.

>>>
===== RESTART: C:/Users/prast/OneDrive/Desktop/ML LAB/EXP 4.py =====
[0, 0] 0
[0, 1] 1
[1, 0] 1
[1, 1] 0
>>>
```