

In [1]:

```
1 import numpy as np
```

In [2]:

```
1 def AND(x1,x2):
2     x = np.array([x1, x2])
3     w = np.array([0.5, 0.5])
4     b = -0.7
5     #tmp = np.sum(w*x) + b
6     tmp = x[0]*w[0] + x[1]*w[1] + b
7
8     if tmp <= 0:
9         return 0
10    else:
11        return 1
```

In [3]:

```
1 AND(1,1), AND(0,0), AND(1,0), AND(0,1)
```

Out[3]:

```
(1, 0, 0, 0)
```

In [4]:

```
1 def NAND(x1, x2):
2     x = np.array([x1, x2])
3     w = np.array([-0.5, -0.5])
4     b = 0.7
5     #tmp = np.sum(w*x) + b
6     tmp = x[0]*w[0] + x[1]*w[1] + b
7
8     if tmp <= 0:
9         return 0
10    else:
11        return 1
```

In [5]:

```
1 NAND(1,1), NAND(0,0), NAND(1,0), NAND(0,1)
```

Out[5]:

```
(0, 1, 1, 1)
```

In [6]:

```

1 def OR(x1, x2):
2     x = np.array([x1, x2])
3     w = np.array([0.5, 0.5])
4     b = -0.2
5     #tmp = np.sum(w*x) + b
6     tmp = x[0]*w[0] + x[1]*w[1] + b
7     if tmp <= 0:
8         return 0
9     else:
10        return 1

```

In [7]:

```
1 OR(1,1), OR(0,0), OR(1,0), OR(0,1)
```

Out[7]:

(1, 0, 1, 1)

In [10]:

```

1 def XOR(x1, x2):
2     s1 = NAND(x1, x2)
3     s2 = OR(x1, x2)
4     y = AND(s1, s2)
5     return y

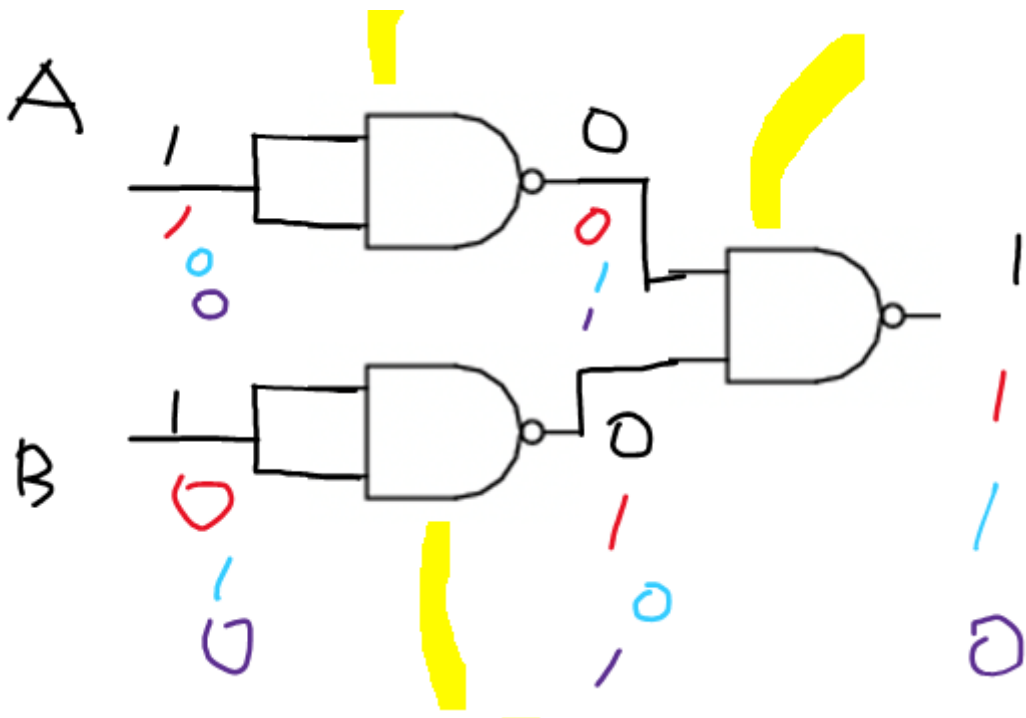
```

In [11]:

```
1 XOR(1,1), XOR(0,0), XOR(1,0), XOR(0,1)
```

Out[11]:

(0, 0, 1, 1)



In [12]:

```

1 def myOR(x1, x2):
2     s1 = NAND(x1, x1)
3     s2 = NAND(x2, x2)
4     y = NAND(s1, s2)
5     return y

```

In [13]:

```

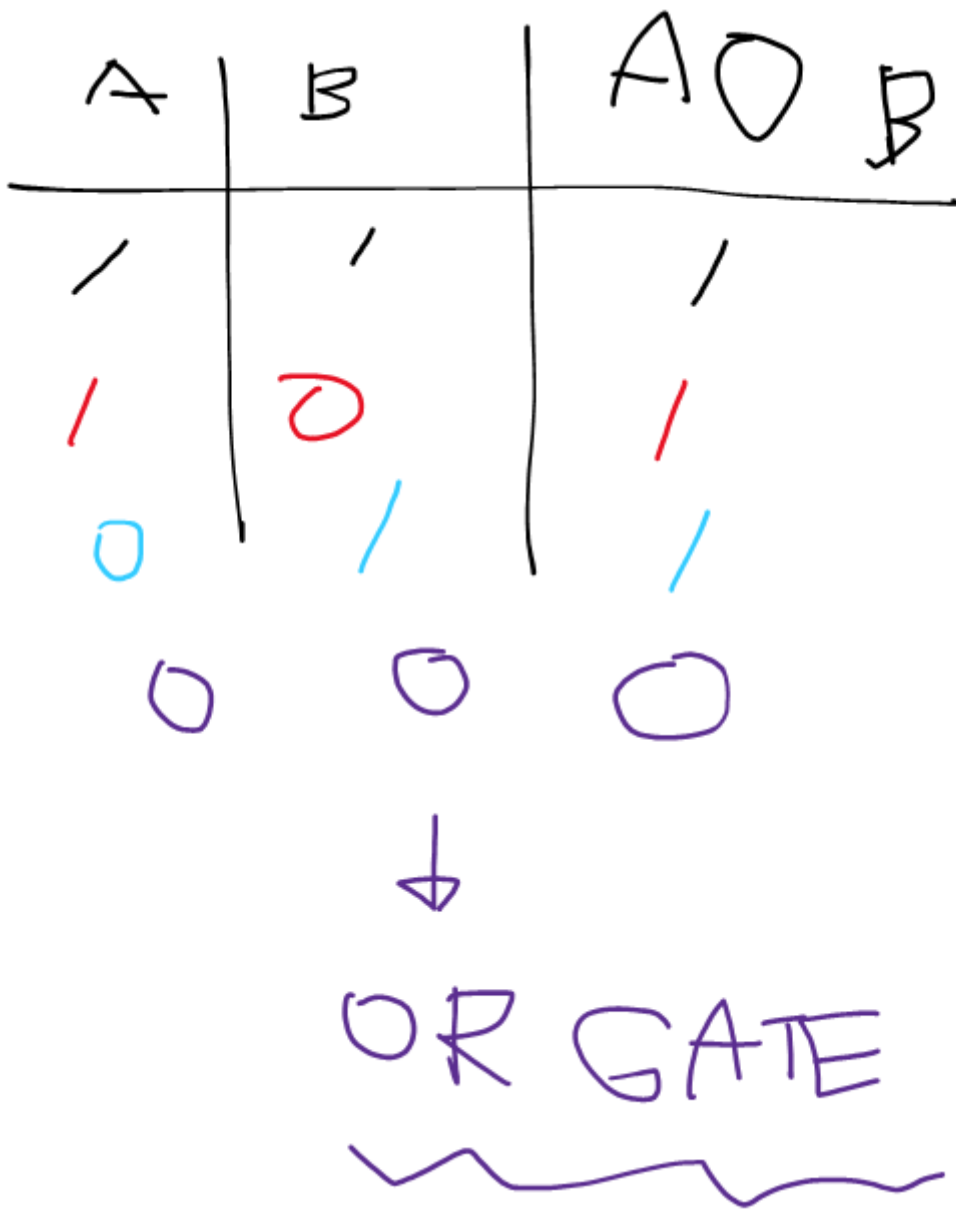
1 print(myOR(1,1), myOR(0,0), myOR(1,0), myOR(0,1))
2 print(OR(1,1), OR(0,0), OR(1,0), OR(0,1))

```

```

1 0 1 1
1 0 1 1

```



In []:

1