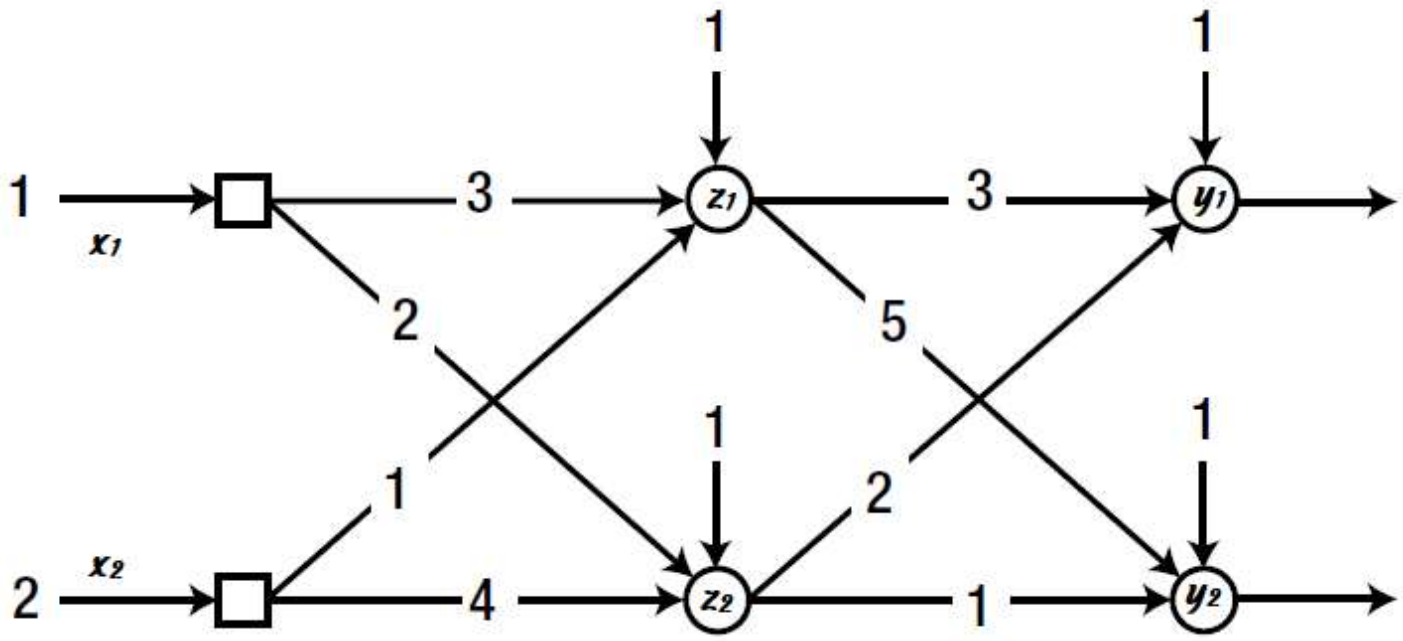
To implement a basic Neural Network




```
1 import numpy as np
```

```
1 x = np.array([[1,2]]).T
2 b = np.array([[1,1]]).T
3 W1=np.array([[3,1],[2,4]])
```

```
1 z = np.dot(W1,x)  +  b
2 z
```

```
array([[ 6],
       [11]])
```

```
1 W2 = np.array([[3,2],[5,1]])
```

```
1 y = np.dot(W2,z) + b
2 y
```

```
array([[41],
       [42]])
```

You can get the same answer with a single layer of output neurons

$$\mathbf{y} = \mathbf{W}\mathbf{x} + \bar{\mathbf{b}}$$

```
# y = np.dot(W2,z) + b

# y = np.dot(W2,np.dot(W1,x)  +  b) + b

# y = np.dot(np.dot(W2,W1),x)  +  np.dot(W2,b) + b

# y = np.dot(np.dot(W2,W1),x)  +  b_hat
```

```
1 y = np.dot(W2,np.dot(W1,x)  +  b) + b
```

```
1 W = np.dot(W2,W1)
2 b_hat = np.dot(W2,b) + b
3 y = np.dot(W,x) + b_hat
4 y
```

```
    array([[41],
           [42]])
```