In [1]:

```
import numpy as np
import matplotlib.pylab as plt
```

ReLU

In [2]:

```
def relu(x):
    return np.maximum(0, x)
```

Sigmoid

$$f(x) = \frac{1}{1 + e^{-x}}$$

$$= \frac{1}{1 + \exp(-x)}$$

In [3]:

```
def sigmoid(x):
    return 1 / (1 + np.exp(-x))
```

Step function

In [4]:

```
def step_function(x):
    return np.array(x > 0, dtype=np.int)
```

Testing the functions

In [5]:

```
X = np.arange(-5.0, 5.0, 0.1)
```

In [6]:

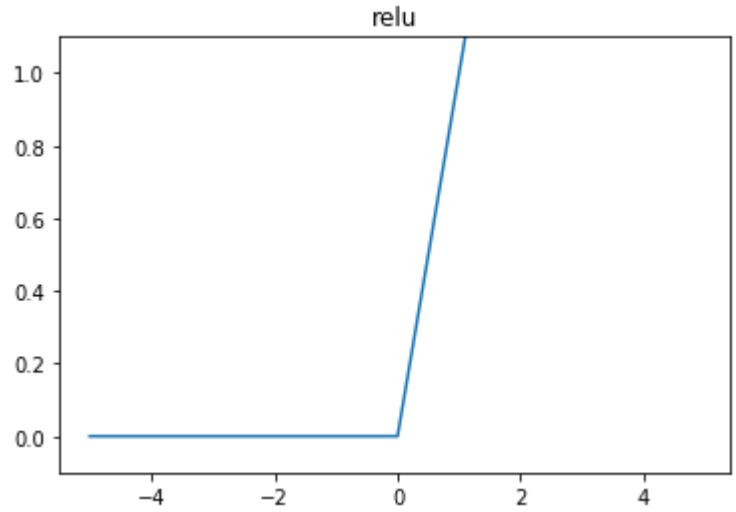
```
Y1 = relu(X)
Y2 = sigmoid(X)
Y3 = step_function(X)
```

In [7]:

```
plt.plot(X, Y1)
plt.ylim(-0.1, 1.1)
plt.title('relu')
```

Out[7]:

```
Text(0.5, 1.0, 'relu')
```

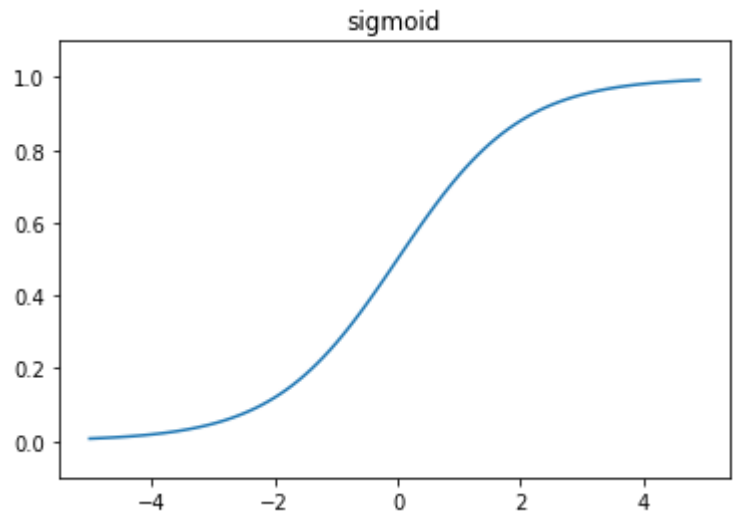


In [8]:

```
plt.plot(X, Y2)
plt.ylim(-0.1, 1.1)
plt.title('sigmoid')
```

Out[8]:

```
Text(0.5, 1.0, 'sigmoid')
```



In [9]:

```
plt.plot(X, Y3)
plt.ylim(-0.1, 1.1)
plt.title('step function')
```

Out[9]:

```
Text(0.5, 1.0, 'step function')
```