

```
In [1]: import numpy as np
import matplotlib.pyplot as plt

def sigmoid(x):
    x = np.asarray(x, dtype=np.float64)
    out = np.empty_like(x)

    pos = x >= 0
    neg = ~pos

    out[pos] = 1.0 / (1.0 + np.exp(-x[pos]))
    expx = np.exp(x[neg])
    out[neg] = expx / (1.0 + expx)
    return out

def sigmoid_grad(x):
    s = sigmoid(x)
    return s * (1.0 - s)

x = np.linspace(-10, 10, 1000)
y = sigmoid(x)
dy = sigmoid_grad(x)

plt.figure(figsize=(9, 5))
plt.plot(x, y, label="sigmoid(x)")
plt.plot(x, dy, label="sigmoid'(x) = sigmoid(x)*(1-sigmoid(x))")
plt.axhline(0, linewidth=1)
plt.axvline(0, linewidth=1)
plt.title("Funkcja sigmoidalna i jej gradient")
plt.xlabel("x")
plt.ylabel("wartość")
plt.grid(True, alpha=0.3)
plt.legend()
plt.show()
```

