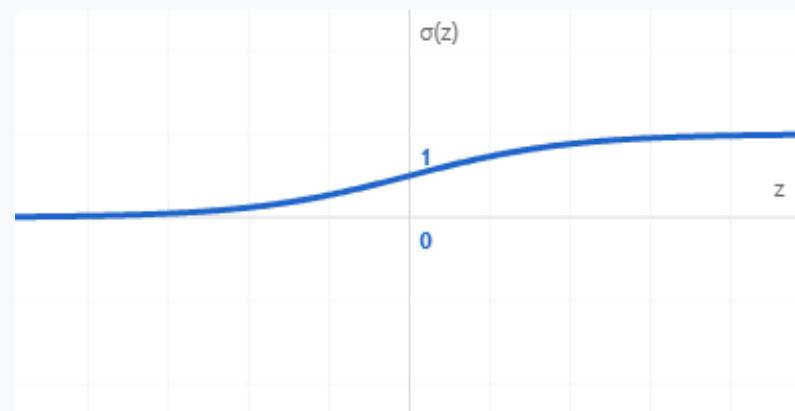


Activation Functions: Sigmoid & Tanh

Sigmoid (σ)



Formula

$$\sigma(z) = 1 / (1 + e^{-z})$$

Tanh (tanh)



Formula

$$\tanh(z) = (e^z - e^{-z}) / (e^z + e^{-z})$$

Key Properties

Range

(0, 1)

(-1, 1)

Zero-centered

✗ No

✓ Yes

Gradient

max = 0.25

max = 1.0

Use Case

Output layer

Hidden layers



Common Issues



Vanishing Gradient: Gradients become very small for large $|z|$, slowing learning



Tanh Advantage: Zero-centered output helps optimization converge faster