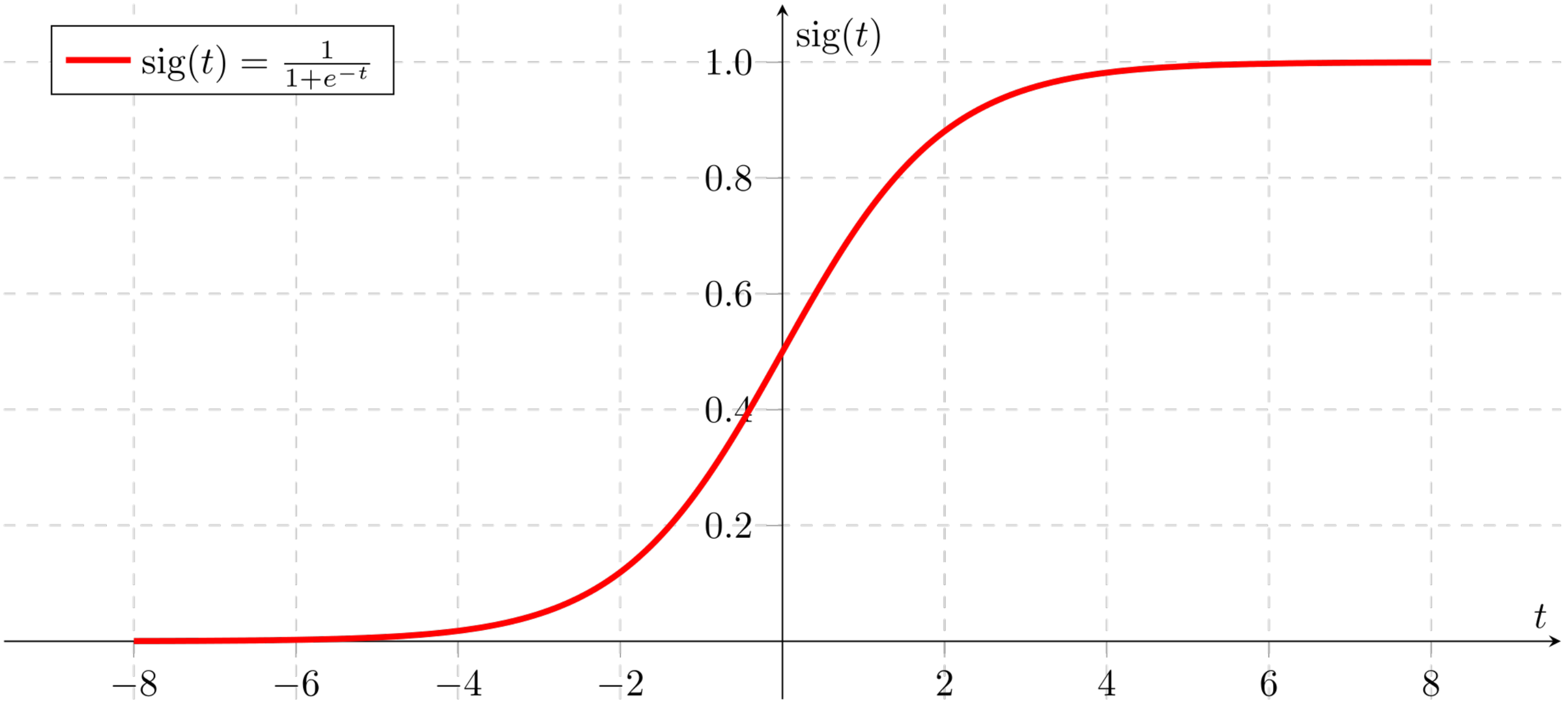
TOPIC - LOGISTIC REGRESSION

WHAT IS LOGISTIC REGRESSION?

- Standard classification machine learning algorithm.
- Uses sigmoid function to convert all outputs to 0 or 1.

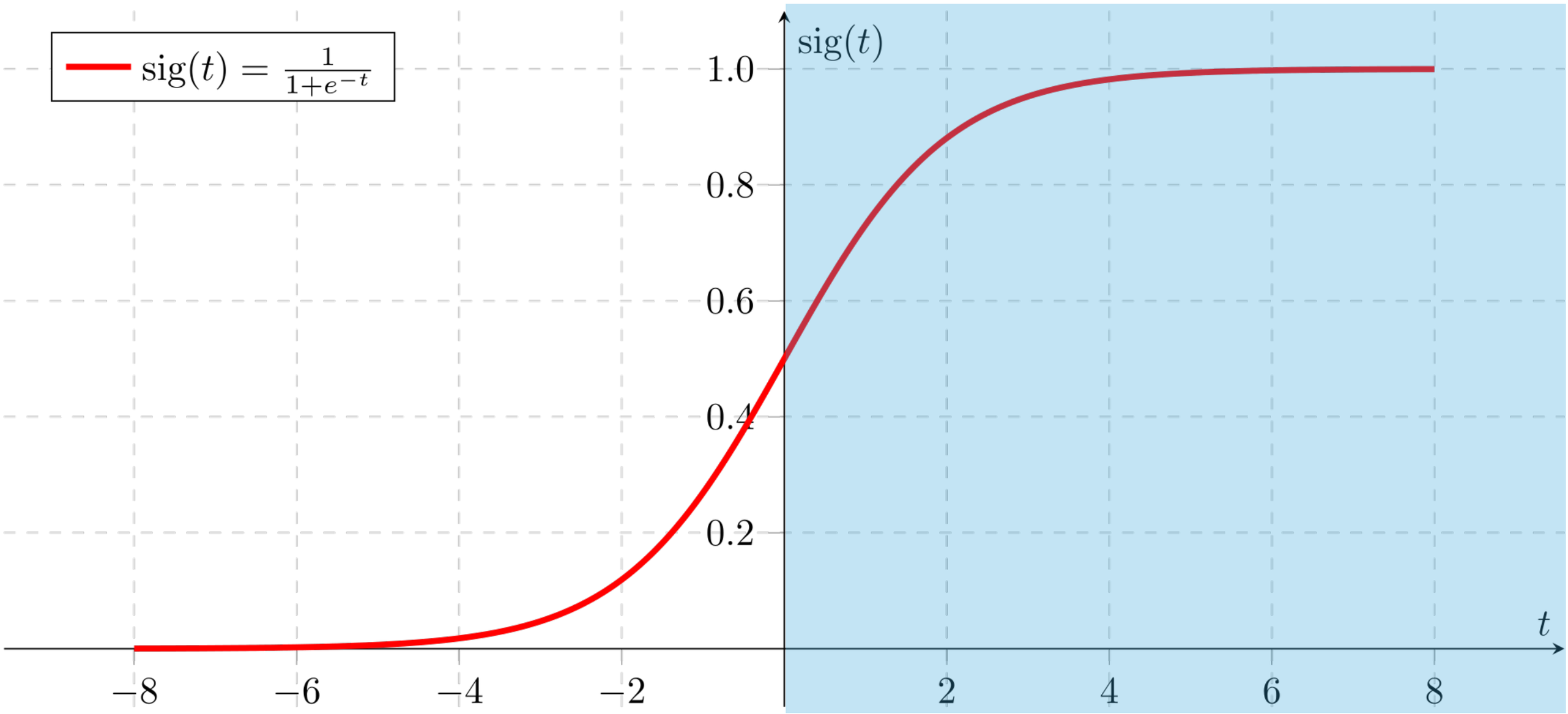
SIGMOID EQUATION

$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



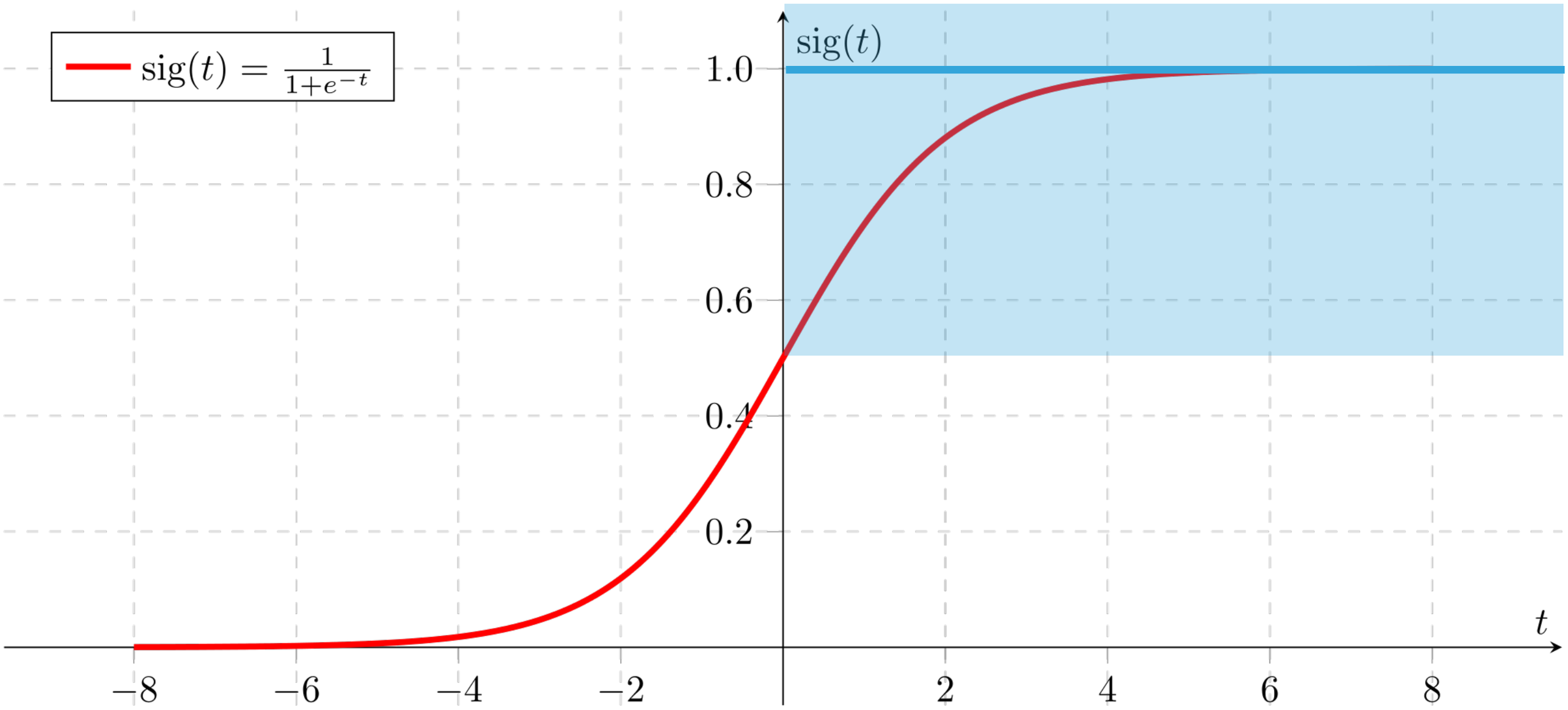
SIGMOID EQUATION

$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



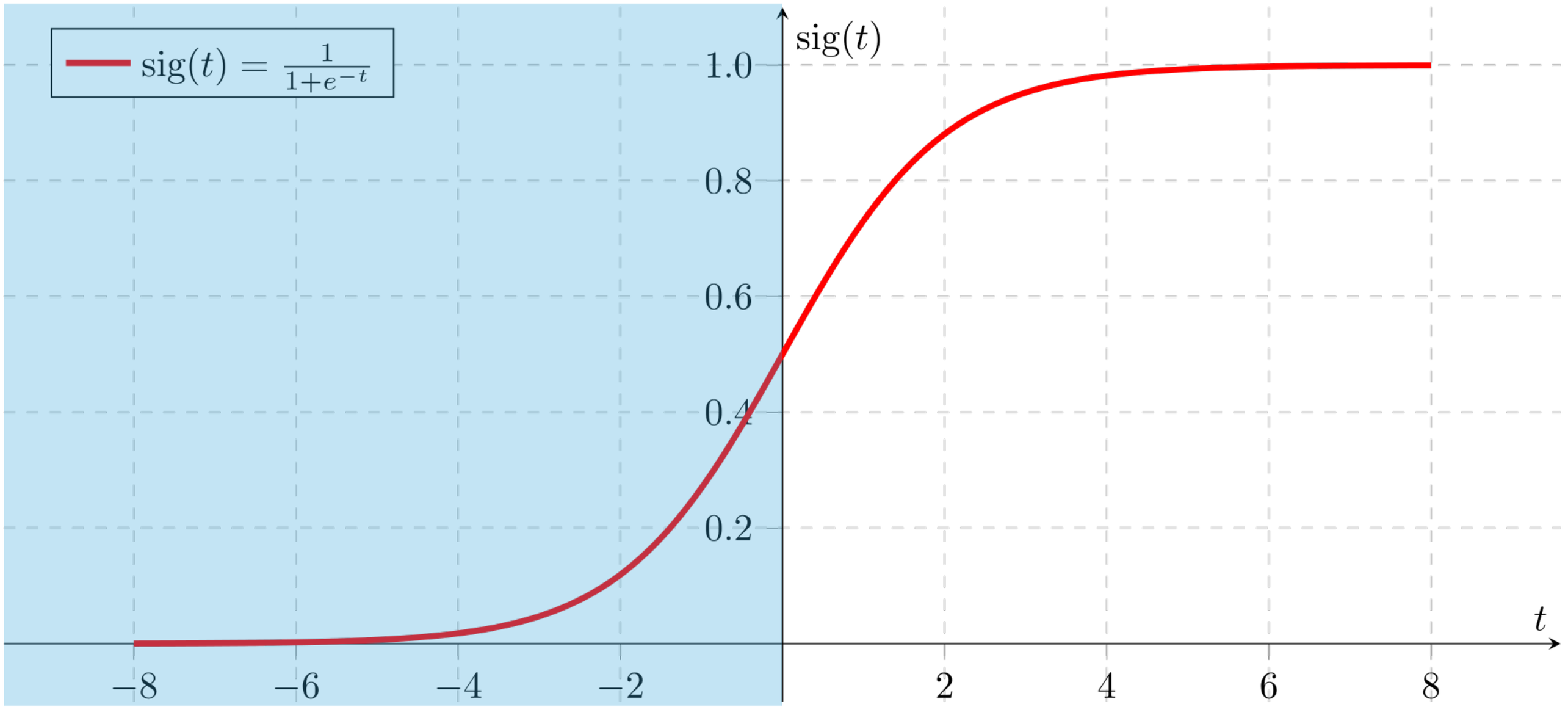
SIGMOID EQUATION

Positive X values are mapped to class 1



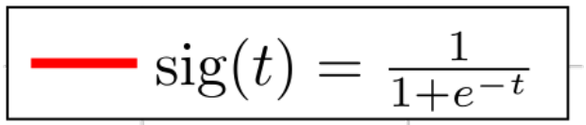
SIGMOID EQUATION

Negative X values



SIGMOID EQUATION

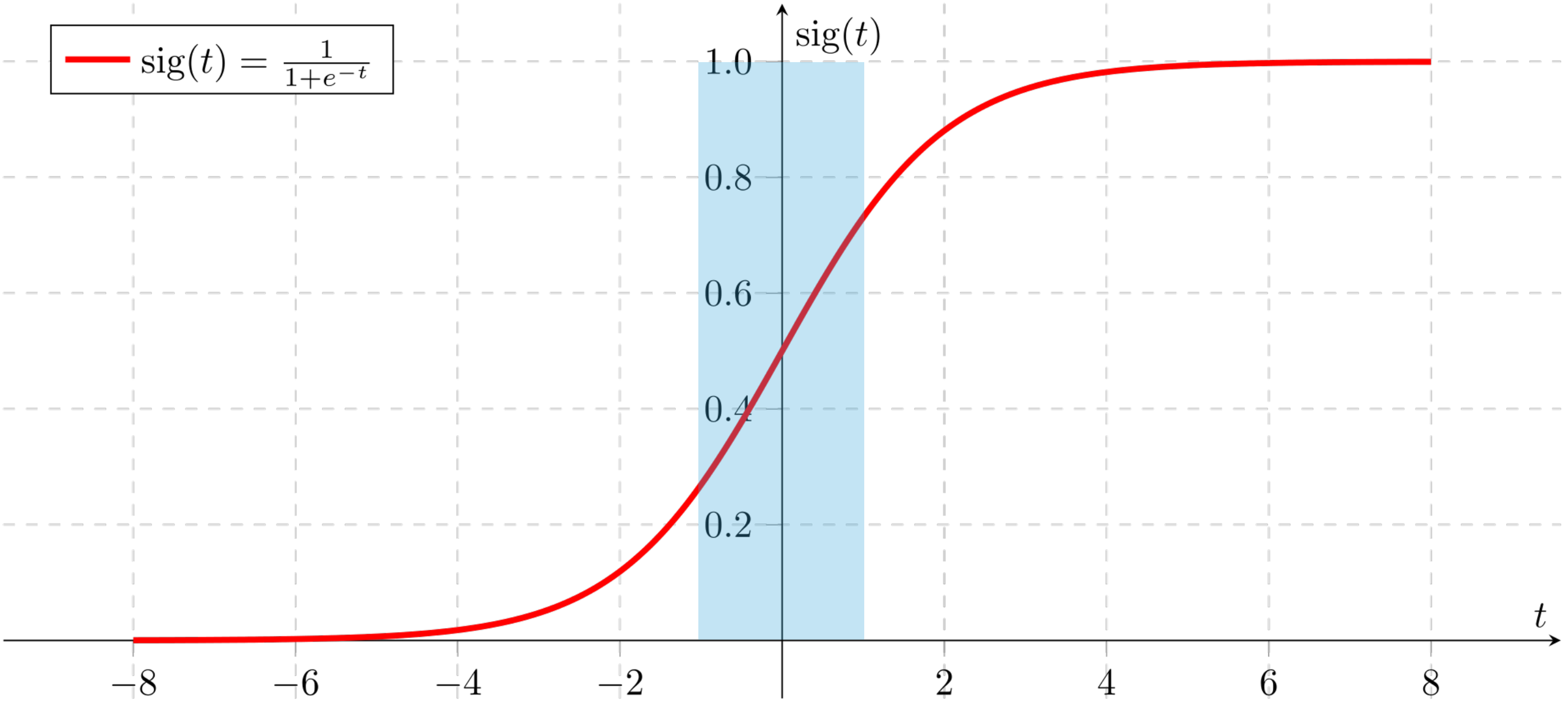
Negative X values are mapped to class 0



SIGMOID EQUATION

$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$

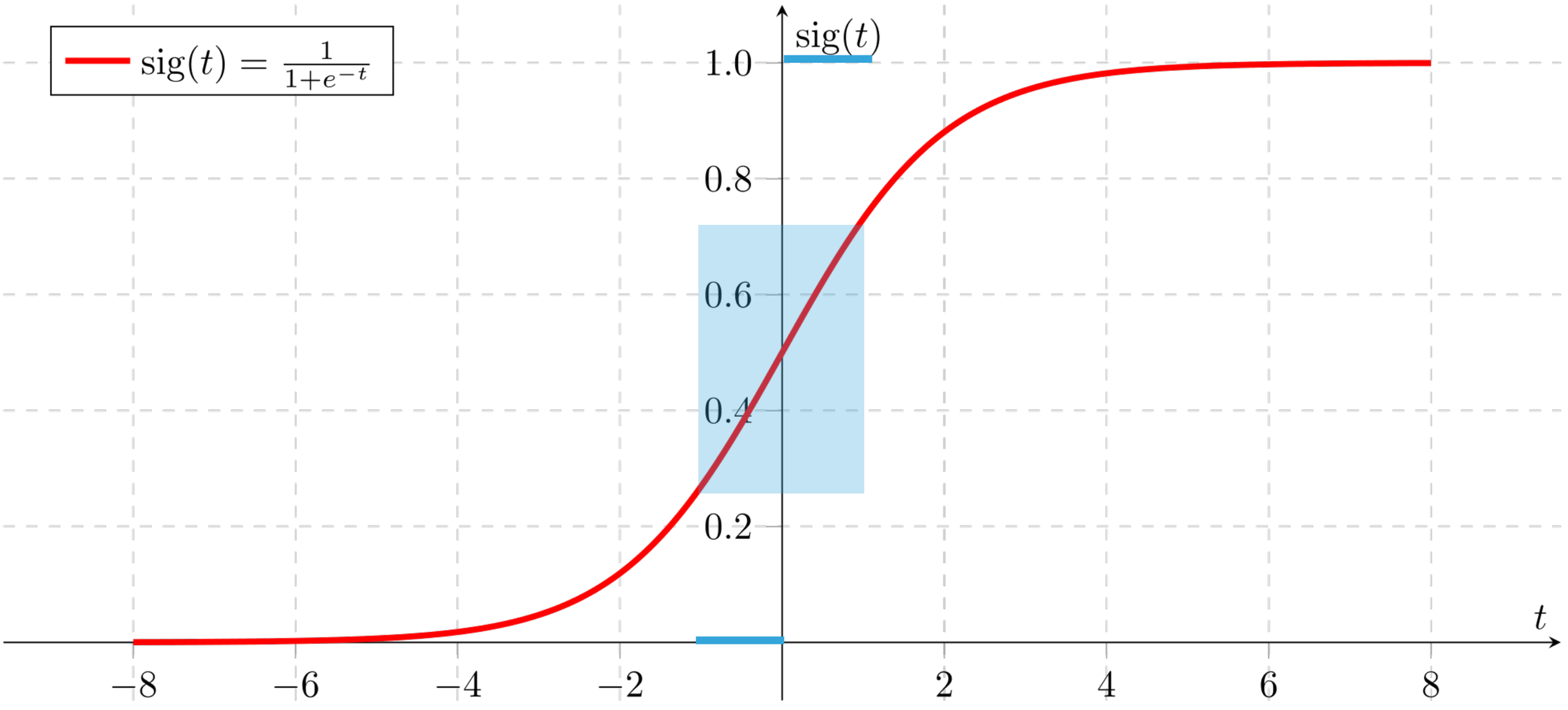
X values in the middle



SIGMOID EQUATION

X values in the middle have the greatest uncertainty

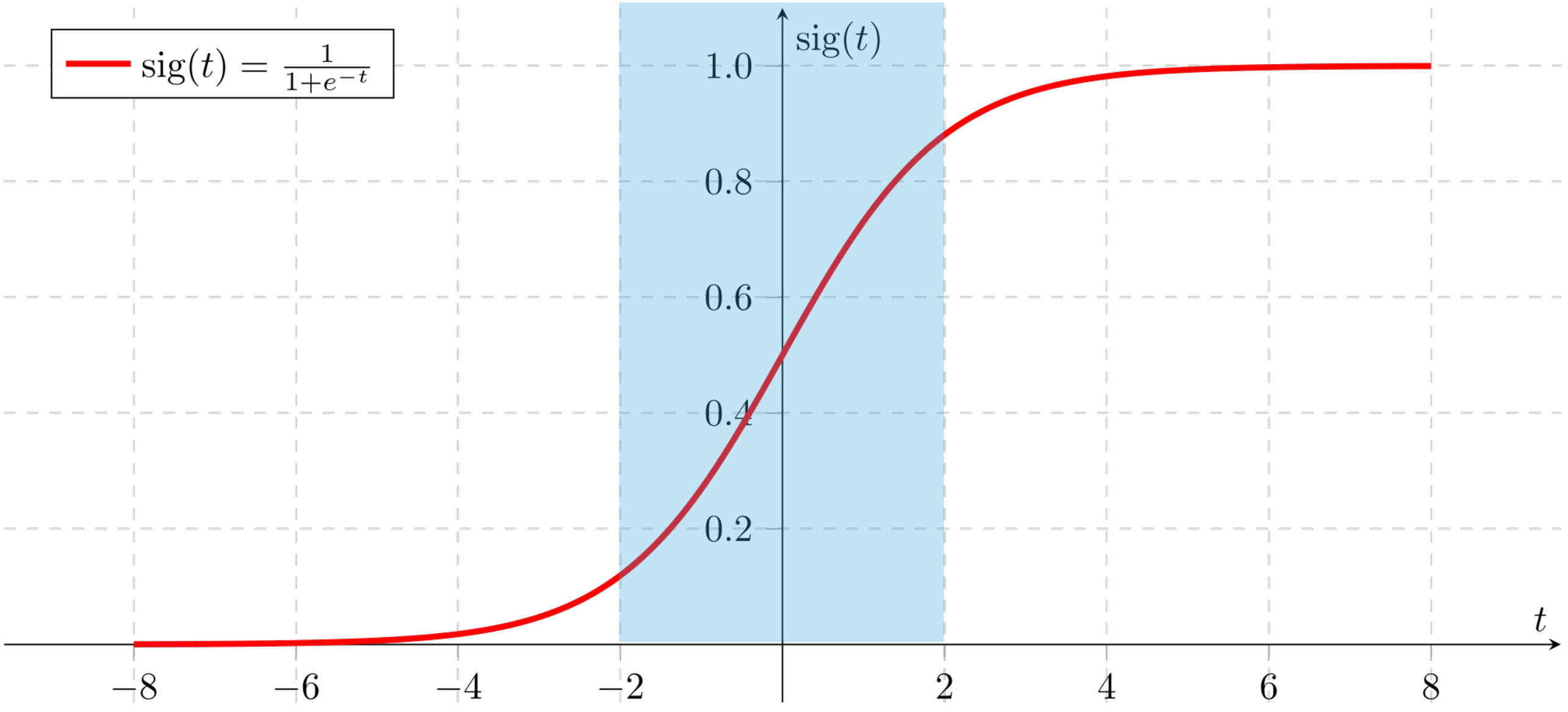
$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



SIGMOID EQUATION

The Sigmoid ranges from 0 to 1

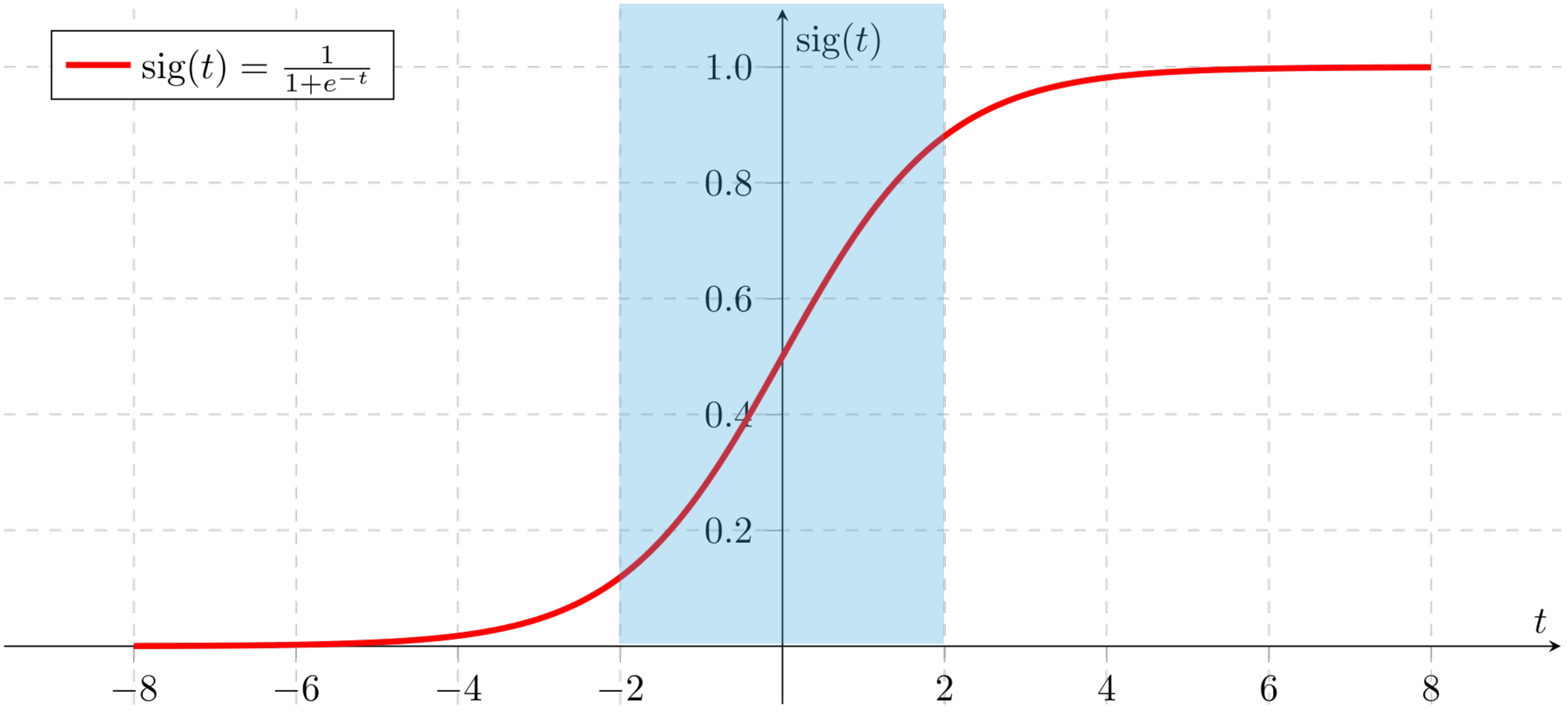
$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



SIGMOID EQUATION

These values may be interpreted as probabilities

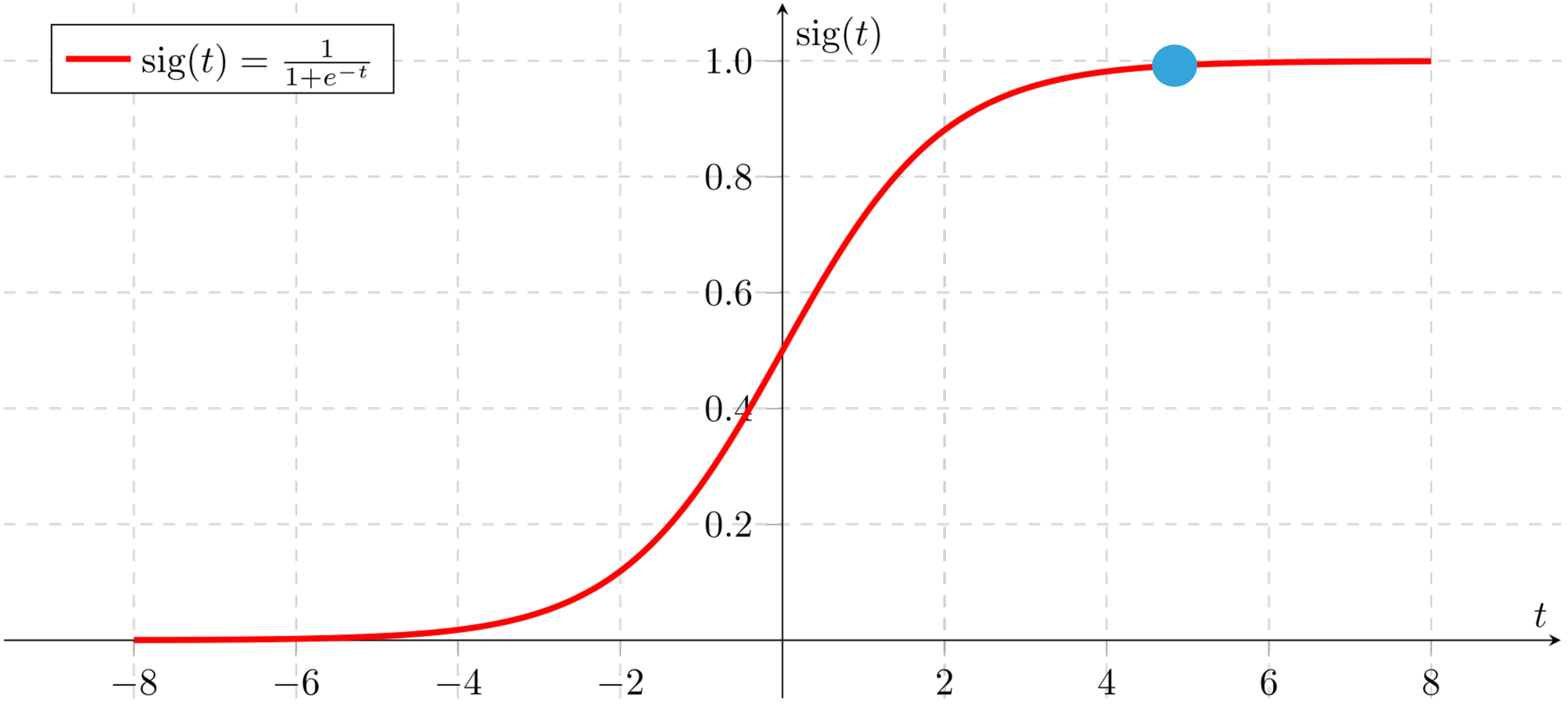
$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



SIGMOID EQUATION

This point is has a y-value of 0.98 so there is a 98% probability it belongs in class 1.

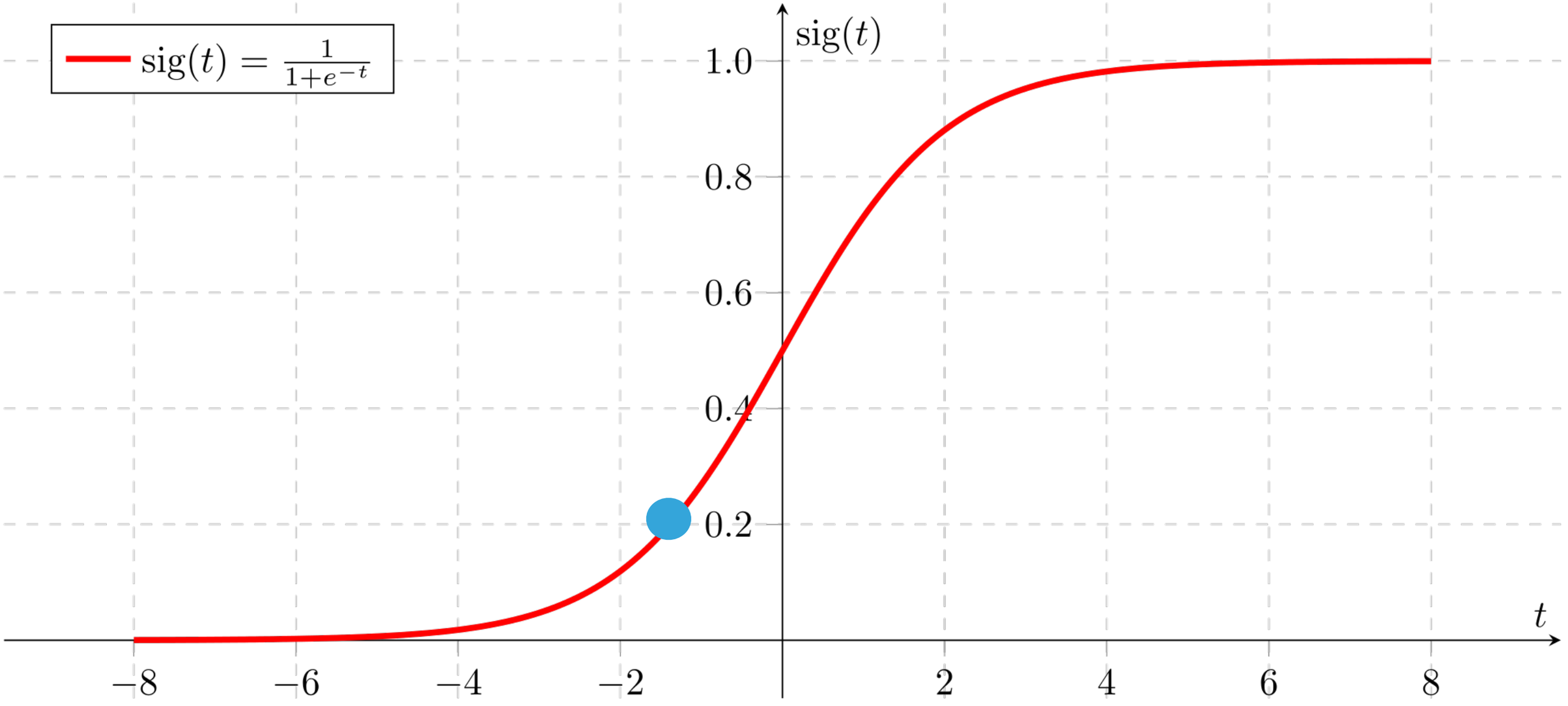
$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



SIGMOID EQUATION

This point is has a y-value of 0.2 so there is a 20% probability it belongs in class 1, and 80% probability it belongs to class 0.

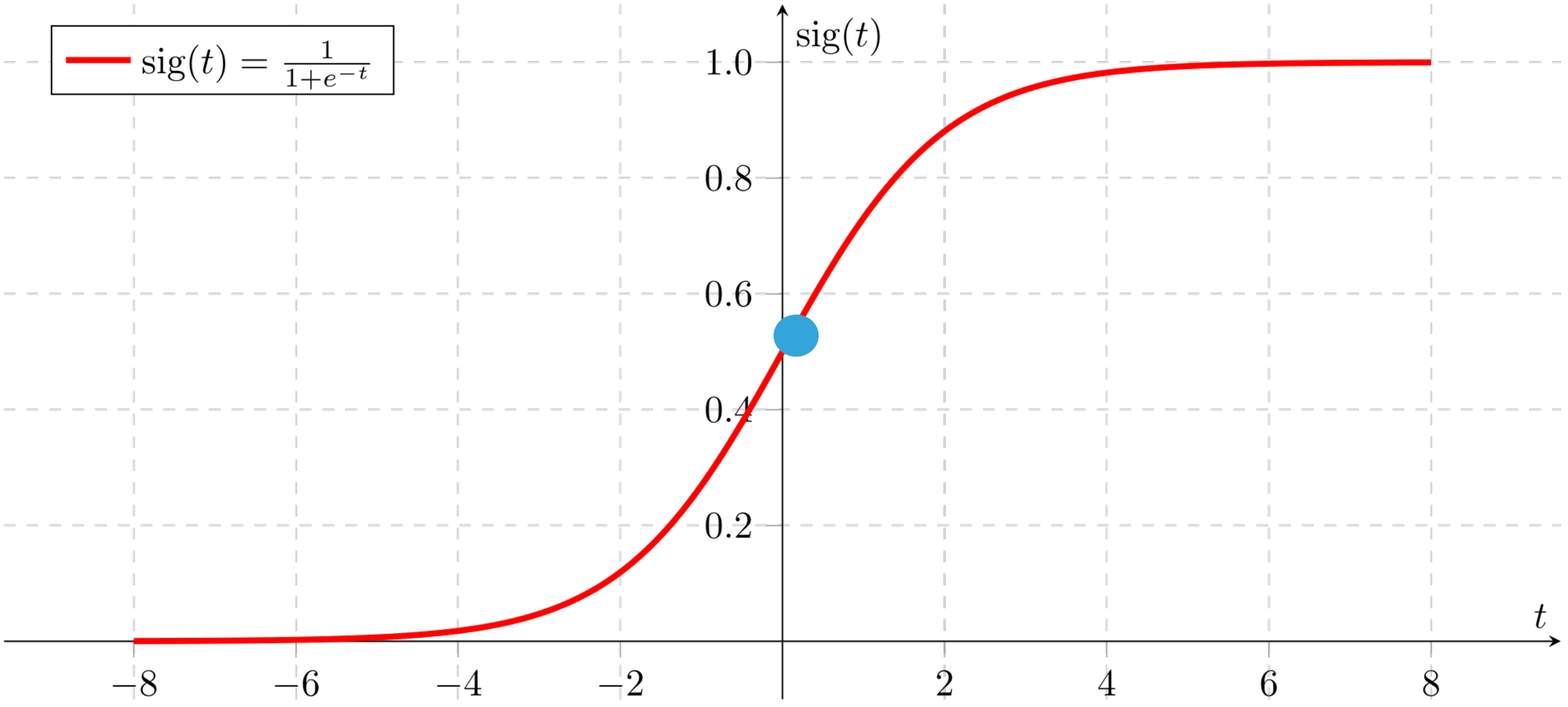
$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



SIGMOID EQUATION

This point is almost indeterminate, but it will be placed in class 1 since there is a probability of greater than 50% it belongs in class 1.

$$\text{sig}(t) = \frac{1}{1+e^{-t}}$$



HOW LOGISTIC REGRESSION WORKS

- Weights are randomly chosen to multiply each column.
- The sum of the weighted columns becomes the X-value.
- The X-value is placed in the sigmoid equation and mapped to 0 or 1.
- The percentage of correct predictions is returned.
- Weights are adjusted depending on the error (using gradient descent).
- The model learns from each row of data when choosing weights.
- More data leads to more learning and better predictions.

LET'S CODE!

Go back to your Colab Noteook.