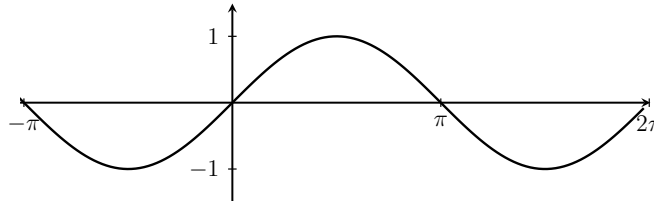


Objectives:

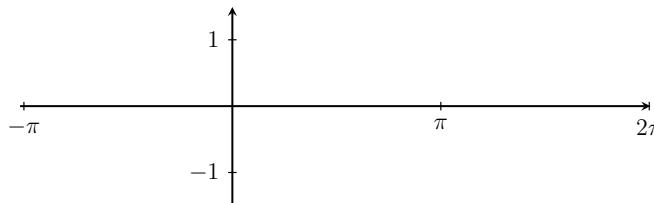
- Take derivatives of trigonometric functions.

Intuition: Let's take a look at $f(x) = \sin(x)$.

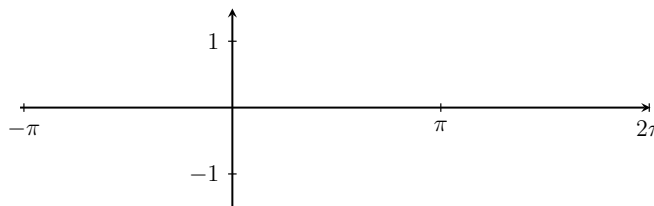
$$f(x) = \sin(x)$$



Guess: $f'(x) =$



Guess: $f''(x) =$



Derivative of $f(x) = \sin(x)$:

$$\frac{d}{dx}(\sin(x)) =$$

Proof:

Derivative of $f(x) = \cos(x)$:

$$\frac{d}{dx}(\cos(x)) =$$

Proof:

More trig functions: What are the derivatives of these trig functions?

- $f(x) = \tan(x)$

- $f(x) = \sec(x)$

Derivatives of trig functions:

$$\frac{d}{dx}(\sin(x)) =$$

$$\frac{d}{dx}(\cos(x)) =$$

$$\frac{d}{dx}(\tan(x)) =$$

$$\frac{d}{dx}(\cot(x)) =$$

$$\frac{d}{dx}(\sec(x)) =$$

$$\frac{d}{dx}(\csc(x)) =$$

Examples: Find the derivatives of the following functions.

1. $f(x) = x^2 \sin(x)$

2. $f(x) = 2^x \tan(x)$

3. $f(x) = \frac{x + \sec(x)}{\sqrt{x}}$

4. $f(x) = x^2 e^x \cot x$

5. $f(x) = \cos(\sqrt{x})$