# 3.5 Derivatives of Trig Functions

Use your knowledge of derivatives to complete the table below.

| Original Function | Reason why the formula is true | Simplified derivative formula |
|---|---|---|
| $y = \sin\theta$ | Using the limit definition and the cool facts that $\lim_{h\to 0}\frac{\sin h}{h} = 0$ and $\lim_{h\to 0}\frac{\cos h - 1}{h} = 1$ is shown here. | $\frac{d}{d\theta}\sin\theta =$ |
| $y = \cos\theta$ | Using the limit definition and the cool facts that $\lim_{h\to 0}\frac{\sin h}{h} = 0$ and $\lim_{h\to 0}\frac{\cos h - 1}{h} = 1$ is shown here. | $\frac{d}{d\theta}\cos\theta =$ |
| $y = \tan\theta = \frac{\square}{\square}$ | $= \frac{\square\cdot\frac{d}{d\theta}\square - \square\cdot\frac{d}{d\theta}\square}{\square\cdot\square}$ $= \frac{\square\cdot\frac{d}{d\theta}\square - \square\cdot\frac{d}{d\theta}\square}{\square\cdot\square}$ | $\frac{d}{d\theta}\tan\theta =$ |
| $y = \cot\theta = \frac{\square}{\square}$ | $\frac{\square\cdot\frac{d}{d\theta}\square - \square\cdot\frac{d}{d\theta}\square}{(\square)^2}$ | $\frac{d}{d\theta}\cot\theta =$ |
| $y = \sec\theta = \frac{\square}{\square}$ | $\frac{\square\cdot\frac{d}{d\theta}\square - \square\cdot\frac{d}{d\theta}\square}{(\square)^2}$ | $\frac{d}{d\theta}\sec\theta =$ |
| $y = \csc\theta = \frac{\square}{\square}$ | $\frac{\square\cdot\frac{d}{d\theta}\square - \square\cdot\frac{d}{d\theta}\square}{(\square)^2}$ | $\frac{d}{d\theta}\csc\theta =$ |

# Derivatives of Trig Functions

Important Ideas:

The derivative of the sine is _____ and the derivative of the co**sine** is _____

The derivative of the tangent is _____ and the derivative of the co**tangent** is _____

The derivative of the secant is _____ and the derivative of the co**secant** is _____

## Check Your Understanding!

In 1 – 5: find the derivative of each function.

1. $f(\theta) = \csc\theta + \sec\theta$

2. $W(t) = \dfrac{1}{\sec t} - \dfrac{2}{3\csc t}$

3. $F(y) = \dfrac{\sin y}{\tan y \cdot \csc y}$

4. $P(x) = \cos x \cdot \tan x$

5. $g(\alpha) = \cot\alpha \cdot \cot\alpha$

6. Find $H'\left(\frac{\pi}{3}\right)$ when $H(x) = \cos x \cdot \tan x + \frac{\sin x + tan x}{\sin x}$