LESSON 3
DERIVATIVES OF TRIG FUNCTIONS

Objective:	To find and use the derivatives of sin(x), cos(x), tan (x), cot(x), sec(x), and csc(x)

Recall that $\lim_{x\to 0} \frac{\sin x}{x} = 1$ and $\lim_{x\to 0} \frac{1-\cos x}{x} = 0$

Derivatives of Trig Functions

$$\frac{d}{dx}\sin x = \cos x \qquad \frac{d}{dx}\cot x = -\csc^2 x$$

$$\frac{d}{dx}\cos x = -\sin x \qquad \frac{d}{dx}\sec x = \sec x \tan x$$

$$\frac{d}{dx}\tan x = \sec^2 x \qquad \frac{d}{dx}\csc x = -\csc x \cot x$$

Examples

1. Find the equation of the line tangent to the graph of $y = \sin x$ at $x = \frac{2\pi}{3}$

2. If $f(x) = \tan x - x,$ then $f'(x) =$

3. Show $\frac{d}{dx}(\sin x \cos x) = \cos 2x$

Problems

1. Derive and learn the derivatives of all six trig functions.

2. Find $f'\left(\frac{7\pi}{6}\right)$, given $f(\theta) = 2\theta^2 \cos\theta$

3. If $f(x) = \tan x$, then $f'\left(\frac{\pi}{4}\right) =$

4. Show $\frac{d}{dx}\left(-\csc x - \sin x\right) = \cos x \cot^2 x$