
Section 3.4

Formulas:

$$\lim_{x \rightarrow 0} \sin x = 0$$

$$\lim_{x \rightarrow 0} \cos x = 1$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$$

$$\sin'(x) = \cos(x)$$

$$\cos'(x) = -\sin(x)$$

$$\tan'(x) =$$

Exercise 1. Find the following limits:

1. $\lim_{x \rightarrow 0} \frac{\sin 5x}{x}$

2. $\lim_{x \rightarrow 0} \frac{\tan x}{4x}$

3. $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 4x}$

4. $\lim_{x \rightarrow 0} \frac{\cos x - 1}{\sin 2x}$

Exercise 2. Find the derivatives of $f(x) = \frac{\sin x}{1 + \cos x}$ $g(x) = x^2 \sin x \cos x$.

Exercise 3. Find the limit $\lim_{x \rightarrow \pi} \frac{\tan x}{\sin 2x}$.

Exercise 4. A ladder 10ft long rests against a vertical wall. Let θ be the angle between the top of the ladder and the wall and let x be the distance from the bottom of the ladder to the wall. If the bottom of the ladder slides away from the wall, how fast does x change with respect to θ when $\theta = \pi/3$?