

2-4 Videos Guide

2-4a

- Derivatives of Trigonometric Functions

- $\frac{d}{dx}(\sin x) = \cos x$
- $\frac{d}{dx}(\cos x) = -\sin x$
- $\frac{d}{dx}(\tan x) = \sec^2 x$
- $\frac{d}{dx}(\csc x) = -\csc x \cot x$
- $\frac{d}{dx}(\sec x) = \sec x \tan x$
- $\frac{d}{dx}(\cot x) = -\csc^2 x$

Exercises:

- Differentiate.
 - $y = x^2 \sin x$
 - $y = \frac{\sin t}{t + \tan t}$

2-4b

- $y = x^2 \sin x \tan x$
- Find the equation of the tangent line to the curve at the given point.
 $y = x + \tan x, (\pi, \pi)$
- Find the points on the curve at which the tangent is horizontal.

$$y = \frac{\cos x}{2 + \sin x}$$

2-4c

- Trigonometric limits
 - $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ (with proof)
 - $\lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$

2-4d

Proof:

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

Exercise:

- Find the limit.
 $\lim_{x \rightarrow 0} \frac{\sin 3x \sin 5x}{x^2}$

2-4e

Proofs:

- The differentiation formula for the sine function
- The differentiation formula for the tangent function