

3.5

3.5 Derivatives with Trig

Objectives:

- I know the Trig derivative rules
- I can find the derivative with a trig component
- I can find a tangent and normal line
- I can determine position, velocity, speed, and acceleration

Warm Up

Find the derivative

1. $y = \frac{3}{x^2}$

2. $f(x) = 3e^5$

3. $g(x) = \frac{x^6}{3}$

4. $y = \frac{x^3}{x+1}$

5. Find the equation of the line tangent to $f(x) = x^3 - 3x$ at $x=4$. Verify graphically.

Numerical derivatives in your calculator

6. Find x coordinates of the turning points of $f(x) = x^3 - 3x$

Find a rule for the derivative of $f(x) = \sin x$

Find a rule for the derivative of $f(x) = \cos x$

Find a rule for the derivative of $f(x) = \tan x$

Trig Rules (Rule Sheet)

$$61. \frac{d}{dx}(\sin x) = \cos x \quad 64. \frac{d}{dx}(\cot x) = -\csc^2 x$$

$$62. \frac{d}{dx}(\cos x) = -\sin x \quad 65. \frac{d}{dx}(\sec x) = \sec x \tan x$$

$$63. \frac{d}{dx}(\tan x) = \sec^2 x \quad 66. \frac{d}{dx}(\csc x) = -\csc x \cot x$$

3.5

1. Find the derivative of $y = x^3 \cos x$

Find the tangent line of $y = \frac{\tan x}{x}$ at $x = \frac{\pi}{4}$

2. Differentiate $f(x) = \frac{\csc x}{x^3}$

Find the normal line of $y = 3x + x \csc x$ at $x = -\frac{3\pi}{4}$

A body is moving in simple harmonic motion according to the equation $s = 1 - 4 \cos t$

a) Find the velocity, speed, and acceleration at time t

b) Find the position, velocity, speed and acceleration at $t = \frac{\pi}{4}$

c) Describe the motion of the body