

Section 3.43

Derivatives of Trigonometric Functions:

$$\frac{d}{dx} (\sin x) = \cos x$$

$$\frac{d}{dx} (\csc x) = -\csc x \cot x$$

$$\frac{d}{dx} (\cos x) = -\sin x$$

$$\frac{d}{dx} (\sec x) = \sec x \tan x$$

$$\frac{d}{dx} (\tan x) = \sec^2 x$$

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

Example 1: Find y' if $y = x^2 \sin x$.

$$f = x^2$$

$$g = \sin x$$

$$f' = 2x$$

$$g' = \cos x$$

$$y' = 2x \sin x + x^2 \cos x$$

Example 2: Differentiate $f(x) = \frac{\sec x}{1 + \tan x}$.

$$\frac{f'g - g'f}{g^2} = \frac{\sec x \tan x (1 + \tan x) - \sec^2 x \sec x}{(1 + \tan x)^2}$$

$$= \frac{\sec x (\tan x (1 + \tan x) - \sec^2 x)}{(1 + \tan x)^2}$$

$$= \frac{\sec x (\tan x + \tan^2 x - \sec^2 x)}{(1 + \tan x)^2}$$

$$= \frac{\sec x (\tan x - 1)}{(1 + \tan x)^2}$$

Homework: page 218 #1-10.