

Derivatives of the Trigonometric Functions

$$D_x [\sin x] = \cos x$$

$$D_x [\cos x] = -\sin x$$

$$D_x [\tan x] = \sec^2 x$$

$$D_x [\cot x] = -\csc^2 x$$

$$D_x [\sec x] = \sec x \tan x$$

$$D_x [\csc x] = -\csc x \cot x$$

$$f(x) = 3 \sin x$$

$$\tan x 2x$$

$$f'(x) = 3 \cos x$$

$$\tan x (2x)$$

$$g'(x) = \tan x + \cot x$$

$$(\tan x) 2x$$

$$2x \tan x$$

$$g'(x) = \sec^2 x - \csc^2 x$$

$$h(x) = x^2 \tan x$$

$$\begin{aligned} h'(x) &= (x^2) \sec^2 x + (\tan x) 2x \\ &= x^2 \sec^2 x + 2x \tan x \end{aligned}$$

$$f(x) = x \sin x + \cos x$$

$$\begin{aligned}f'(x) &= x \cos x + \sin x - \sin x \\&= x \cos x\end{aligned}$$

$$g(x) = 3 \sec x \tan x$$

$$\begin{aligned}g'(x) &= 3 \left[\sec x \sec^2 x + \tan x \sec x \tan x \right] \\&= 3 \left[\sec^3 x + \sec x \tan^2 x \right]\end{aligned}$$