Stewart Section 3.4

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Derivatives of Trigonometric Functions

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The resulting formulas for $\sin$, $\cos$, and tan are:

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

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The formulas for $\csc$, $\sec$, and cot are:

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

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

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

Trigonometric Functions - A Short Rev

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The notations

$$\sin^2 x \quad \text{and} \quad \cos^2 x$$

are interpreted as

$$(\sin x)^2 \quad \text{and} \quad (\cos x)^2,$$

respectively.

Derivatives of Trigonometric Functions

The key to applying the definition of a derivative to trigonometric functions is the following important limits, which are derived in the text:

$$\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$$

$$\lim_{\theta \to 0} \frac{\cos\theta - 1}{\theta} = 0$$