The derivatives of $y = \tan u$**,** $y = \cot u$**,** $y = \sec u$**,** $y = \csc u$:

$$\frac{d}{dx}(\tan u) = \sec^2 u \frac{du}{dx}, \qquad \frac{d}{dx}\cot u = -\csc^2 u \frac{du}{dx}.$$

$$\frac{d}{dx}(\sec u) = \sec u \tan u \frac{du}{dx}, \qquad \frac{d}{dx}\csc u = -\csc u \cot u \frac{du}{dx}.$$

Example 1. Find the derivative of $y = \sqrt{\tan x}$.

Example 2. Find the derivative of $y = x \sec x^2$.

Example 3. Differentiate $y = \sin 2x \cot x^2$.

Example 4. Find the derivative of $z = \sqrt{w + \csc w^3}$.

Example 5. Find dy/dx by implicit differentiation: $y^2 = \tan y + x$.