

The reciprocal relationship shown in example 1 is sometimes written as: $\frac{dy}{dx} = \frac{1}{\frac{dx}{dy}}$

2. Let $f(x) = \tan x$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$

Find the derivative of the inverse tangent function.

Note: This shows that the derivative of an inverse trig function is an algebraic function. Just like the derivative of the transcendental function $f(x) = \ln x$ is an algebraic function $f'(x) = \frac{1}{x}$.

Derivatives of Inverse Trigonometric Functions:

Let u be a differentiable function of x .

$$\frac{d}{dx} [\arcsin u] = \frac{u'}{\sqrt{1-u^2}} \qquad \frac{d}{dx} [\arccos u] = \frac{-u'}{\sqrt{1-u^2}}$$

$$\frac{d}{dx} [\arctan u] = \frac{u'}{1+u^2} \qquad \frac{d}{dx} [\operatorname{arccot} u] = \frac{-u'}{1+u^2}$$

$$\frac{d}{dx} [\operatorname{arcsec} u] = \frac{u'}{|u|\sqrt{u^2-1}} \qquad \frac{d}{dx} [\operatorname{arccsc} u] = \frac{-u'}{|u|\sqrt{u^2-1}}$$

Proof for $\frac{d}{dx}[\arcsin x] =$

3. Differentiate $y = \operatorname{arcsec}(2x)$

4. Differentiate $y = 2\ln(t^2 + 4) - \arctan\frac{t}{2}$

5. Differentiate $y = \arcsin(e^{3x})$

6. Find the equation of the tangent line to the graph of the equation $\arctan(xy) = \arcsin(x + y)$ at $(0,0)$.