

Inverse Trigonometric Functions - Differentiation

Differentiation

$$\frac{d}{dx} \arcsin u = \frac{1}{\sqrt{1-u^2}} \cdot \frac{du}{dx}$$

$$\frac{d}{dx} \operatorname{arccsc} u = -\frac{1}{|u|\sqrt{u^2-1}} \cdot \frac{du}{dx}$$

$$\frac{d}{dx} \arccos u = -\frac{1}{\sqrt{1-u^2}} \cdot \frac{du}{dx}$$

$$\frac{d}{dx} \operatorname{arcsec} u = \frac{1}{|u|\sqrt{u^2-1}} \cdot \frac{du}{dx}$$

$$\frac{d}{dx} \arctan u = \frac{1}{1+u^2} \cdot \frac{du}{dx}$$

$$\frac{d}{dx} \operatorname{arccot} u = -\frac{1}{1+u^2} \cdot \frac{du}{dx}$$

Directions: For questions 1 through 6, verify each differentiation formula.

1. $\frac{d}{dx} \arcsin x = \frac{1}{\sqrt{1-x^2}}$

$$2. \frac{d}{dx} \arccos x = -\frac{1}{\sqrt{1-x^2}}$$

$$3. \frac{d}{dx} \arctan x = \frac{1}{1+x^2}$$

$$4. \frac{d}{dx} \operatorname{arc} \csc x = -\frac{1}{|x|\sqrt{x^2-1}}$$

$$5. \frac{d}{dx} \operatorname{arc} \sec x = \frac{1}{|x|\sqrt{x^2-1}}$$

6. $\frac{d}{dx} \operatorname{arc cot} x = -\frac{1}{1+x^2}$

Directions: For questions 7 through 10, find each derivative.

7. $y = \arcsin \frac{x}{2}$

$$8. y = \frac{\arccos 3x}{x}$$

$$9. y = x \arctan x^2$$

10. $y = \tan(\arcsin \sqrt{x})$