

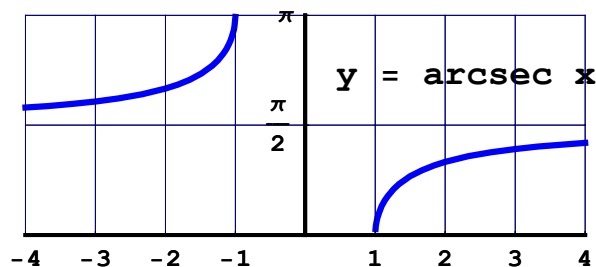
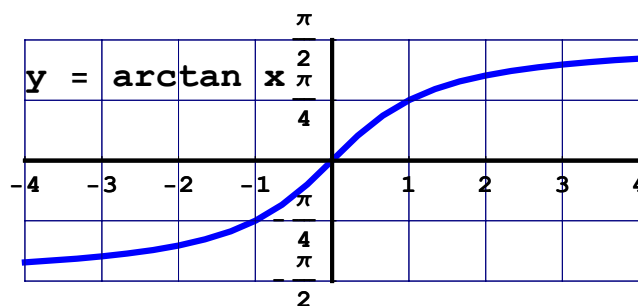
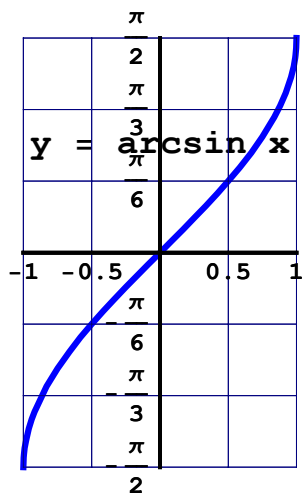
## 3.8 Derivatives of Inverse Trigonometric Functions

### Inverse Trigonometric Function Derivatives

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

$$\frac{d}{dx} \tan^{-1} u = \frac{1}{1+u^2} \frac{du}{dx}$$

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



### Inverse Cofunction Identities

$$\cos^{-1} x = \frac{\pi}{2} - \sin^{-1} x$$

$$\cot^{-1} x = \frac{\pi}{2} - \tan^{-1} x$$

$$\csc^{-1} x = \frac{\pi}{2} - \sec^{-1} x$$

For problems 1–6, find  $\frac{dy}{dx}$

1.  $y = \cos^{-1}(2x^{-3})$

2.  $y = x \cot^{-1} \sqrt{2x+3}$

3.  $y = \frac{1}{\sin^{-1}(3x)}$

4.  $y = \cot^{-1}\left(\frac{1}{x}\right) - \tan^{-1}x$

5.  $y = \frac{\sec^{-1}(x+1)}{x}$

6.  $y = 5 \tan^{-1}(x^3 + 3x)$

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7. Let  $f(x) = x^5 + 2x - 1$ . Find  $f(1)$ ,  $f'(1)$ ,  $f^{-1}(2)$ , and  $(f^{-1})'(2)$

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8. Derive the formula for the derivative of  $y = \cot^{-1}x$

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9. Find the right end behavior model for  $y = \sec^{-1}x$  and  $y = \sin^{-1}x$