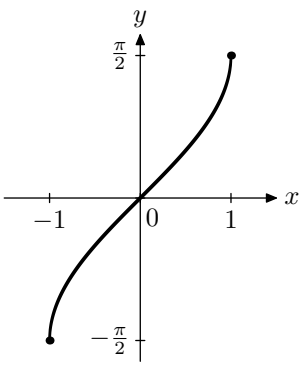
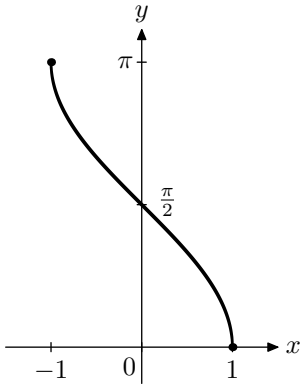
Inverse Trigonometric Functions

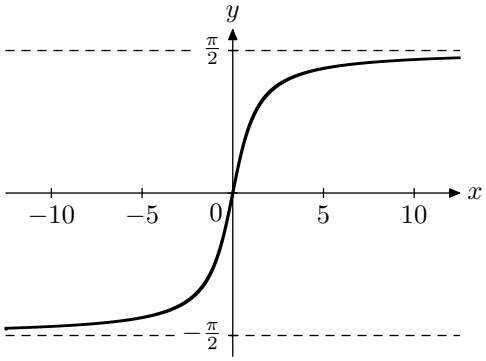
Function	Domain	Range
$\arcsin x$	$[-1, 1]$	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
$\arccos x$	$[-1, 1]$	$[0, \pi]$
$\arctan x$	$(-\infty, \infty)$	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$



Graph of $y = \arcsin x$



Graph of $y = \arccos x$



Graph of $y = \arctan x$

Composition

$$\sin(\arcsin x) = x, \quad \text{for all } x \in [-1, 1] \qquad \arcsin(\sin x) = x, \quad \text{for all } x \in \left[-\tfrac{\pi}{2}, \tfrac{\pi}{2}\right]$$
$$\cos(\arccos x) = x, \quad \text{for all } x \in [-1, 1] \qquad \arccos(\cos x) = x, \quad \text{for all } x \in [0, \pi]$$
$$\tan(\arctan x) = x, \quad \text{for all } x \in (-\infty, \infty) \qquad \arctan(\tan x) = x, \quad \text{for all } x \in \left(-\tfrac{\pi}{2}, \tfrac{\pi}{2}\right)$$

Derivative

$$\frac{d}{dx}\arcsin x = \frac{1}{\sqrt{1-x^2}} \qquad \frac{d}{dx}\arccos x = \frac{-1}{\sqrt{1-x^2}} \qquad \frac{d}{dx}\arctan x = \frac{1}{1+x^2}$$

Notation

$$\arcsin x = \sin^{-1} x \qquad \arccos x = \cos^{-1} x \qquad \arctan x = \tan^{-1} x$$

Note that the -1 in these notations is not an exponent, e.g., $\sin^{-1} x \neq \frac{1}{\sin x}$.

Gilles Cazelais. Typeset with LaTeX on January 10, 2008.