Inverse Trigonometric Functions

$$y = \arcsin x\,, \quad \text{Domain } = [-1,1]\,, \quad \text{Range } = [-\frac{\pi}{2}, \frac{\pi}{2}]\,,$$

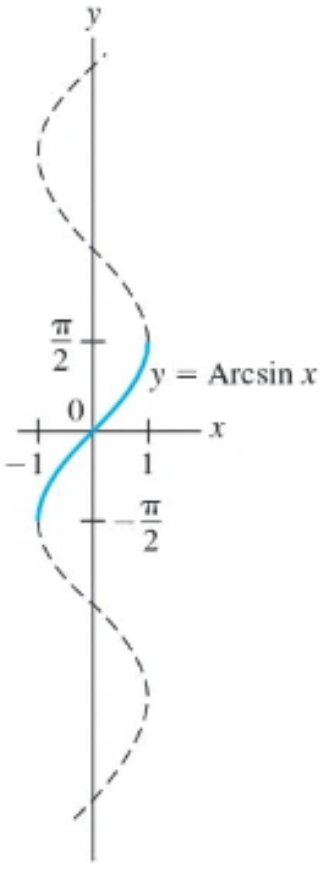
$$y = \arccos x\,, \quad \text{Domain } = [-1,1]\,, \quad \text{Range } = [0, \pi]\,,$$

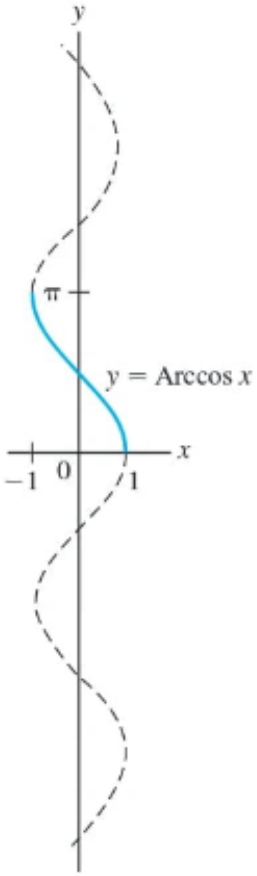
$$y = \arctan x\,, \quad \text{Domain } = (-\infty, \infty)\,, \quad \text{Range } = (-\frac{\pi}{2}, \frac{\pi}{2})\,.$$

By definition,

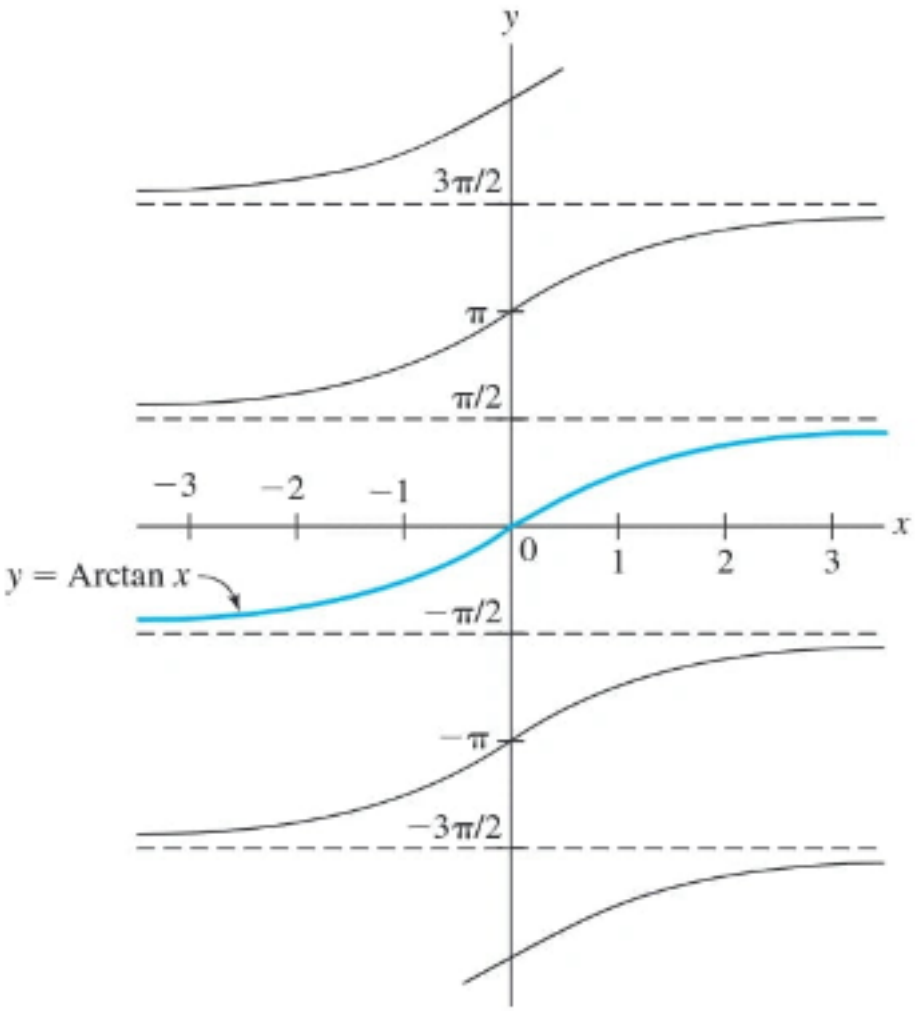
$$y = \arcsin x \quad \text{implies} \quad x = \sin y\,,$$
$$y = \arccos x \quad \text{implies} \quad x = \cos y\,,$$
$$y = \arctan x \quad \text{implies} \quad x = \tan y\,.$$

Graphs of inverse trigonometric functions :





Note that $y = \arcsin x$ is an increasing functions while $y = \arccos x$ is a decreasing function. $y = \arctan x$ (shown below) is also an increasing function.



Example 1. Evaluate (*a*) $\arcsin\left(\frac{1}{\sqrt{2}}\right)$ (*b*) $\arccos\left(-\frac{\sqrt{3}}{2}\right)$ (*c*) $\arctan(-\sqrt{3})$.

Example 2. Find an algebraic expression for $\tan(\arcsin 2x)$.

Example 3. Evaluate $\sin(\arccos(-3/4))$.