

4.7 Inverse Trigonometric Functions

$\sin \rightarrow$ inverse \sin^{-1} or arcsin
 $\cos \rightarrow$ inverse \cos^{-1} or arccos
 $\tan \rightarrow$ inverse \tan^{-1} or arctan

Example 1 Inverse Sine Function

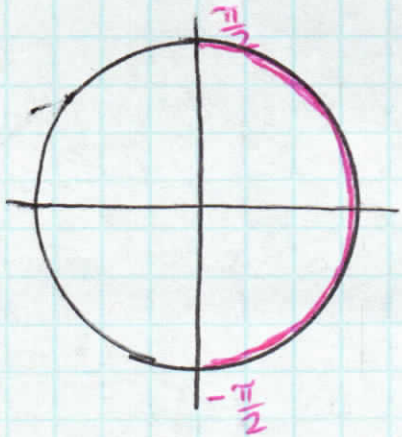
$y = \arcsin x$ if and only if $\sin y = x$

Domain: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ ^{$\sin y = x$} Range: $[-1, 1]$

$y = \arcsin x$

Domain $[-1, 1]$

Range $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$



Find $\arcsin\left(-\frac{1}{2}\right)$ in the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Solution = $\frac{11\pi}{6}$ or $-\frac{\pi}{6}$

coterminal angle \nearrow

Find $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) =$ (in the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$)

Solution = $\frac{\pi}{3}$

$\sin^{-1}(2)$

no solution! The hypotenuse is the longest side!

Find all solutions from $(0 - 2\pi)$ if

$\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45 \rightarrow \frac{\pi}{4}$

$Q_1 = \frac{\pi}{4}$

$45 \cdot \frac{\pi}{180} = \frac{45\pi}{180} = \frac{\pi}{4}$

$Q_2 = \frac{3\pi}{4}$

Inverse Cosine Function

$$\cos y = x$$

$$\text{Domain } [0, \pi] \quad \text{Range } [-1, 1]$$

$$y = \arccos x$$

$$\text{Domain } [-1, 1] \quad \text{Range } [0, \pi]$$

Find the solution on the interval $[0, \pi]$ if

$$\arccos = \left(-\frac{\sqrt{3}}{2}\right) \quad \text{Solution} = \frac{5\pi}{6}$$