Inverse Trigonometric Function Review

Basic Trig functions

$\cos\frac{\pi}{3} =$ $\frac{1}{2}$ $\sin\frac{7\pi}{4} =$ $-\frac{1}{\sqrt{2}}$ $\tan 120^\circ =$ $-\sqrt{3}$ $\csc\frac{\pi}{2} =$ 1

Inverse trig functions work the following way

$\tan\theta = -1 \quad \theta =$ $\cos\theta = -\frac{1}{2} \quad \theta =$ $\csc\theta = 2 \quad \theta =$

each of the above equations could be re-written as the following

$\tan^{-1}(-1) =$ $-\frac{\pi}{4}$ $\cos^{-1}(-\frac{1}{2}) =$ $\frac{2\pi}{3}$ $arc\csc(2)$ $= \frac{\pi}{6}$

Because we want these relations to be functions we need to restrict the range that each of the following inverse trig functions have.

$\cos^{-1}x$ = Range $[0,\pi]$

$\sin^{-1}x$ = Range$[-\frac{\pi}{2},\frac{\pi}{2}]$

$\sec^{-1}x$ = Range $[0,\pi]$

$\csc^{-1}x$ = Range$[-\frac{\pi}{2},\frac{\pi}{2}]$

$\cot^{-1}x$ = Range $[0,\pi]$

$\tan^{-1}x$ = Range$[-\frac{\pi}{2},\frac{\pi}{2}]$

When we look at the graphs of these functions we need to make sure that the inverse of each trig function passes the vertical line test.

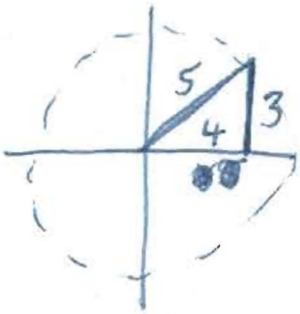
Answer the following examples.

$\sin^{-1}(-\frac{1}{2})$ $\cos^{-1}(\frac{\sqrt{3}}{2})$ $\tan^{-1}(-\sqrt{3})$ $\sec^{-1}(-1)$ $\cos^{-1}(-\frac{\sqrt{2}}{2})$

$-\frac{\pi}{6}$ $\frac{\pi}{6}$ $-\frac{\pi}{3}$ π $\frac{3\pi}{4}$

We can also work problems using right triangles.

$\tan(\cos^{-1}(\frac{4}{5})) = \frac{3}{4}$ $\cos(\sin^{-1}(\frac{1}{3})) = \frac{2\sqrt{2}}{3}$ $\csc(\cos^{-1}(x)) = \frac{1}{\sqrt{1-x^2}}$



$\cos\theta = \frac{x}{r}$

$\sin\theta = \frac{y}{r}$

$\tan\theta = \frac{y}{x}$