

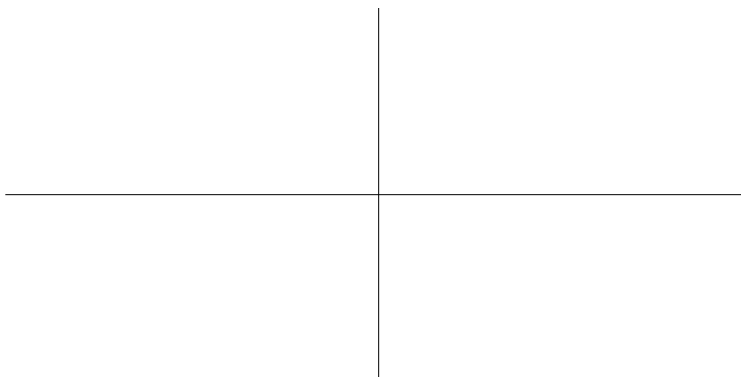
7.4a Inverse Trig Functions

Objectives: (1) Find the domain and range of the inverse functions, (2) Find the values of the inverse and composite functions, (3) Solve equations involving inverse functions.

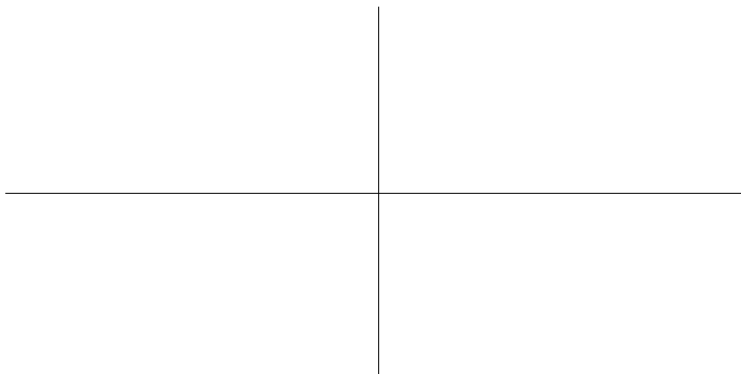
Back in chapter 6.1 we used inverse trig functions to solve for angles given two sides of a triangle. In this section, we take an analytical look at inverse trigonometric functions.

💡 Recall that in order for a Function to have an inverse, the function must be one-to-one. Obviously the trig functions are not one-to-one on their entire domain.

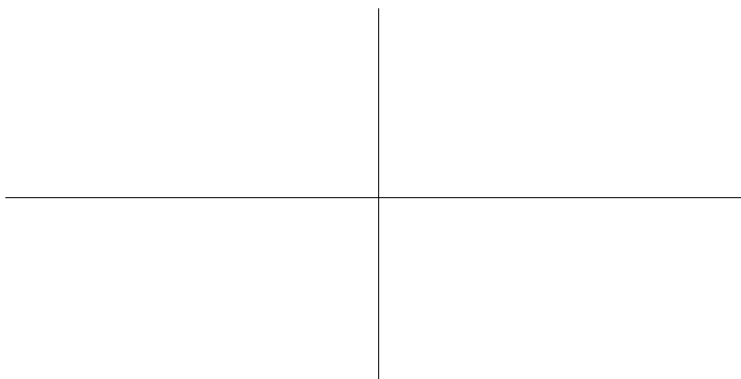
Example 1 Graph $f(x) = \sin(x)$ and determine the most logical domain restriction to make a portion of it one-to-one. Write down the domain and range. Graph the inverse function $f^{-1}(x) = \sin^{-1}(x)$, and write down the domain and range.



Example 2 Graph $f(x) = \cos(x)$ and determine the most logical domain restriction to make a portion of it one-to-one. Write down the domain and range. Graph the inverse function $f^{-1}(x) = \cos^{-1}(x)$, and write down the domain and range.



Example 3 Graph $f(x) = \tan(x)$ and determine the most logical domain restriction to make a portion of it one-to-one. Write down the domain and range. Graph the inverse function $f^{-1}(x) = \tan^{-1}(x)$, and write down the domain and range.



Example 4 Find the exact value of $\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)$, and use your calculator to compute the approximate value.

Example 5 Evaluate the expression $\sin(\cos^{-1}(\frac{7}{9}))$

Example 6 Find the value of the following:

(a) $\cos(\cos^{-1}(\frac{1}{3}))$

(b) $\sin^{-1}(\sin(\frac{4\pi}{3}))$

(c) $\cos^{-1}(\sin(\frac{7\pi}{6}))$

(d) $\sin(\sin^{-1}(\frac{-\pi}{4}))$

Example 7 Find the domain and range of f and f^{-1} given $f(x) = 2 \cos(\frac{\pi}{4}x) + 3$. Hint: choose the most logical domain to make f one-to-one.

