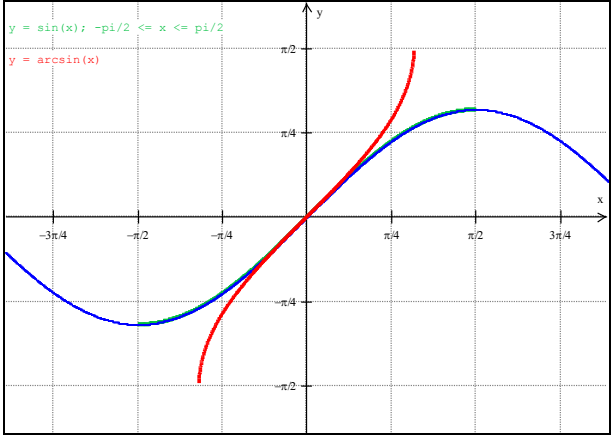
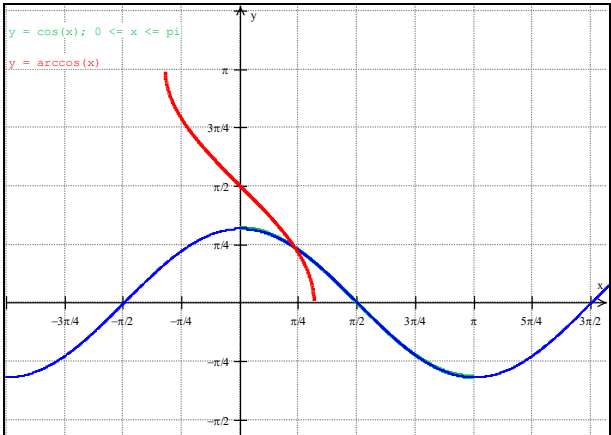


7.7 Inverse Trigonometric Functions and Technology

<p>A Inverse Sine Function</p> <p>The sine function is not a function one-to-one and its inverse relation is not a function. By convention, the domain of the sine function is restricted to $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ such that its inverse relation becomes a function. This inverse function is called the inverse sine function $\sin^{-1}(x)$. So:</p> $\sin(x) : \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \rightarrow [-1, 1]$ $\sin^{-1}(x) : [-1, 1] \rightarrow \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$	 <p>The scientific calculators implement the inverse sine function as defined above.</p>
<p>Ex 1. Solve each trigonometric equation.</p> <p>a) $\sin \theta = 0.1$</p> <p>b) $\sin(2\theta) = -0.3, \quad 0 \leq \theta \leq 2\pi$</p>	<p>c) $\sin \frac{\theta}{3} = 0.7, \quad -2\pi \leq \theta \leq 2\pi$</p>
<p>B Inverse Cosine Function</p> <p>The cosine function is not a function one-to-one and its inverse relation is not a function. By convention, the domain of the cosine function is restricted to $[0, \pi]$ such that its inverse relation becomes a function. This inverse function is called the inverse cosine function $\cos^{-1}(x)$. So:</p> $\cos(x) : [0, \pi] \rightarrow [-1, 1]$ $\cos^{-1}(x) : [-1, 1] \rightarrow [0, \pi]$	 <p>The scientific calculators implement the inverse cosine function as defined above.</p>

Ex 2. Solve each trigonometric equation.

a) $\cos \theta = -0.6$

b) $\cos(\theta/2) = 0.25, \quad -\pi \leq \theta \leq \pi$

C Inverse Tangent Function

The tangent function is not a function one-to-one and its inverse relation is not a function.

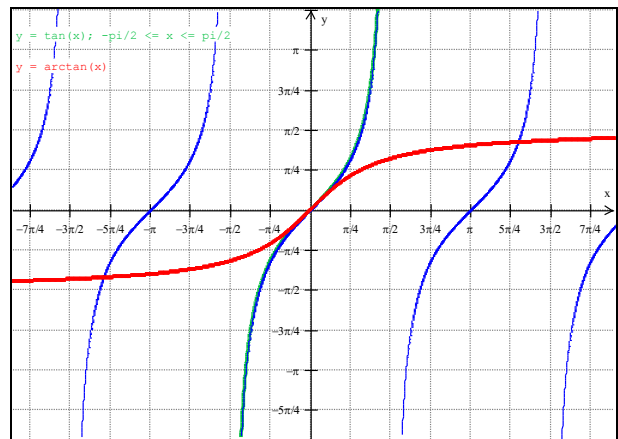
By convention, the domain of the tangent function is

restricted to $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ such that its inverse relation

becomes a function. This inverse function is called the inverse tangent function $\tan^{-1}(x)$. So:

$$\tan(x) : \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \rightarrow (-\infty, \infty)$$

$$\tan^{-1}(x) : (-\infty, \infty) \rightarrow \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$$



The scientific calculators implement the inverse tangent function as defined above.

Ex 3. Solve each trigonometric equation.

a) $\tan \theta = 5$

b) $\tan(3\theta) = -3, \quad -\pi \leq \theta \leq \pi$