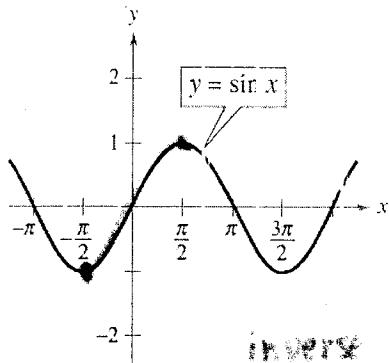
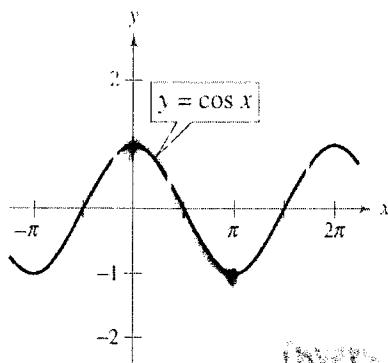
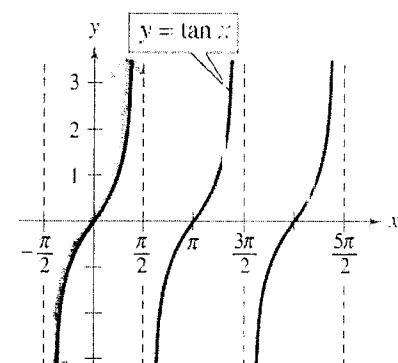
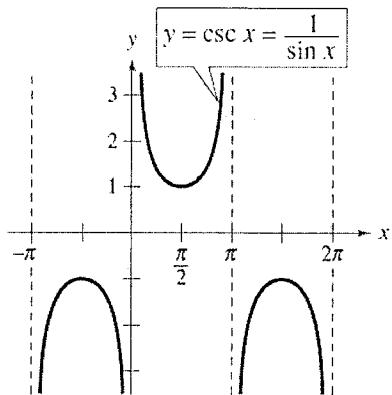
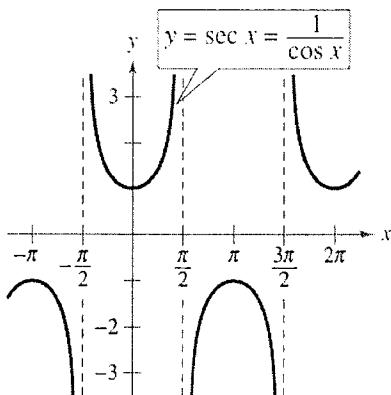
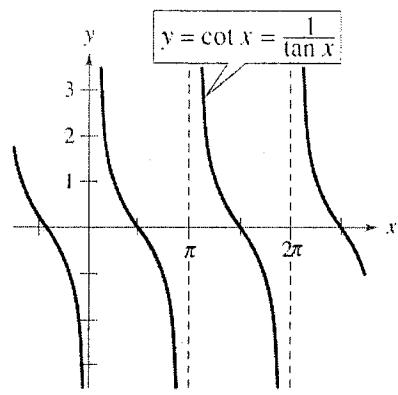
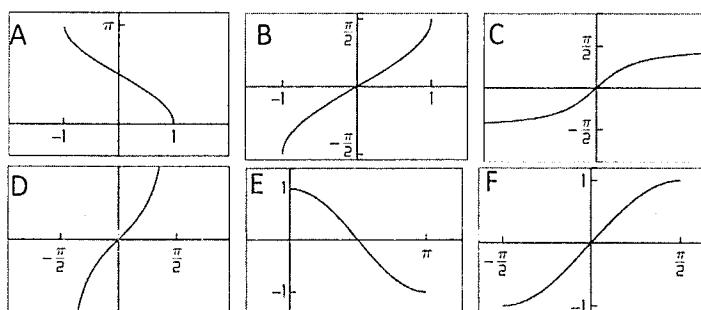


A function will only have an inverse that is a function given that it is one-to-one. Since we know what the graphs of sine, cosine, and tangent look like, it is clear that they are not one-to-one. However, if you restrict the domain of each function to an interval, then the restricted function IS one-to-one! **The inverse function is the inverse of the restricted portion of the function.**

DOMAIN: $(-\infty, \infty)$ RANGE: $[-1, 1]$ PERIOD: 2π DOMAIN: $(-\infty, \infty)$ RANGE: $[-1, 1]$ PERIOD: 2π DOMAIN: ALL $x \neq \frac{\pi}{2} + n\pi$ RANGE: $(-\infty, \infty)$ PERIOD: π DOMAIN: ALL $x \neq n\pi$ RANGE: $(-\infty, -1] \cup [1, \infty)$ PERIOD: 2π DOMAIN: ALL $x \neq \frac{\pi}{2} + n\pi$ RANGE: $(-\infty, -1] \cup [1, \infty)$ PERIOD: 2π DOMAIN: ALL $x \neq n\pi$ RANGE: $(-\infty, \infty)$ PERIOD: π

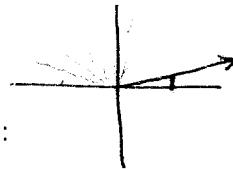
*****Which is Which?*****

- 1) $y = \sin x$
- 2) $y = \cos x$
- 3) $y = \tan x$
- 4) $y = \arcsin x$
- 5) $y = \arccos x$
- 6) $y = \arctan x$



THE ARCSINE FUNCTION 4th, 1st quod

DEFINITION-----The unique angle y in the interval $[-\pi/2, \pi/2]$ such that $\sin(y) = x$ is the inverse sine (or arcsine) of x . Denoted $\sin^{-1}x$ or $\arcsin x$. The domain of $y = \sin^{-1}x$ is $[-1, 1]$ and the range is $[-\frac{\pi}{2}, \frac{\pi}{2}]$



Ex1) Find the exact value of each expression without a calculator:

(a) $\sin^{-1}\left(\frac{1}{2}\right)$

$\frac{\pi}{6}$

(b) $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

$-\frac{\pi}{3}$

(c) $\sin^{-1}\left(\frac{\pi}{2}\right)$

undefined
→ 1.57

(d) $\sin^{-1}\left(\sin\left(\frac{\pi}{9}\right)\right)$

$\frac{\pi}{9}$

(e) $\sin^{-1}\left(\sin\left(\frac{5\pi}{6}\right)\right)$

$\sin^{-1}\left(\frac{1}{2}\right)$
 $\boxed{\frac{\pi}{6}}$

Ex2) Use a calculator to evaluate the following values:

(a) $\sin^{-1}(-0.81)$

-0.944

(b) $\sin^{-1}(\sin(3.49\pi))$

-1.539

*What mode should be used?

*How do you know?

radians

range of $\arcsin x$
is $[-\frac{\pi}{2}, \frac{\pi}{2}]$

THE ARCCOSINE & ARCTANGENT FUNCTIONS

DEFINITION-----The unique angle y in the interval $[0, \pi]$ such that $\cos(y) = x$ is the inverse cosine (or arccosine) of x . Denoted $\cos^{-1}x$ or $\arccos x$. The domain of $y = \cos^{-1}x$ is $[-1, 1]$ and the range is $[0, \pi]$

DEFINITION-----The unique angle y in the interval $(-\pi/2, \pi/2)$ such that $\tan(y) = x$ is the inverse tangent (or arctangent) of x . Denoted $\tan^{-1}x$ or $\arctan x$. The domain of $y = \tan^{-1}x$ is $(-\infty, \infty)$ and the range is $(-\pi/2, \pi/2)$

Ex3) Find the exact value of the following expressions without a calculator

(a) $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

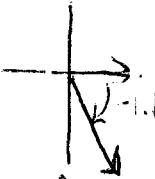
$\frac{3\pi}{4}$

(b) $\tan^{-1}(\sqrt{3})$

$\frac{\pi}{3}$

(c) $\cos^{-1}(\cos(-1.1))$

4th quad



d) $\cos^{-1}\left(\cos\frac{11\pi}{6}\right)$

$\cos^{-1}\frac{\sqrt{3}}{2}$

$\frac{11\pi}{6}$