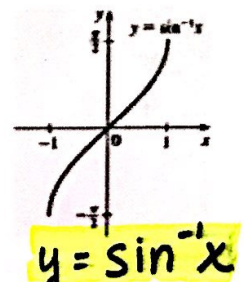
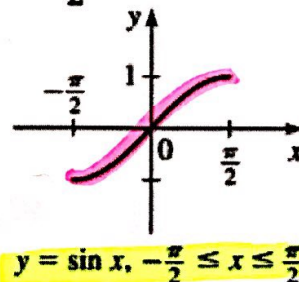
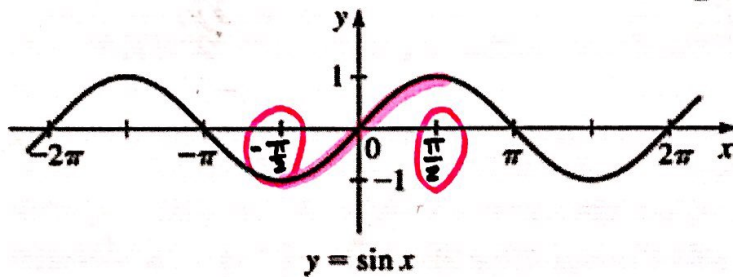


# Inverse Trigonometric Functions

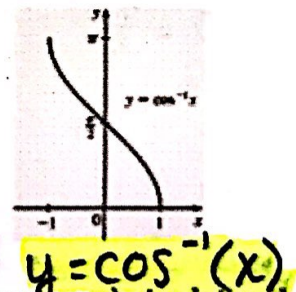
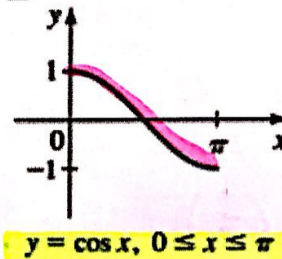
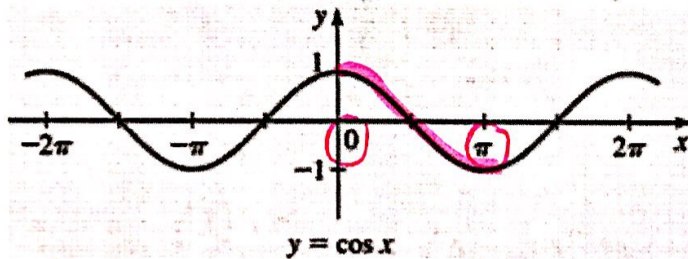
**DEFINITION:** The inverse sine function, denoted by  $\sin^{-1} x$  (or  $\arcsin x$ ), is defined to be the inverse of the restricted sine function

$$\sin x, \quad -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$$



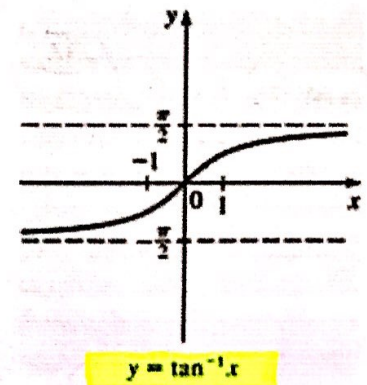
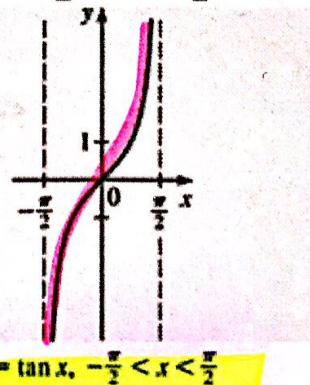
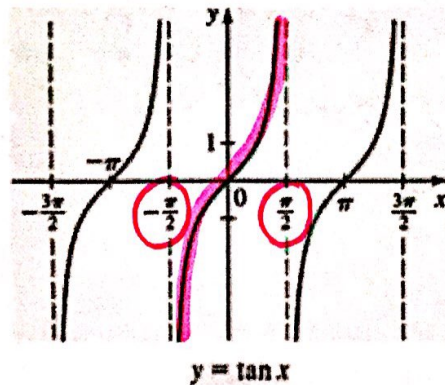
**DEFINITION:** The inverse cosine function, denoted by  $\cos^{-1} x$  (or  $\arccos x$ ), is defined to be the inverse of the restricted cosine function

$$\cos x, \quad 0 \leq x \leq \pi$$

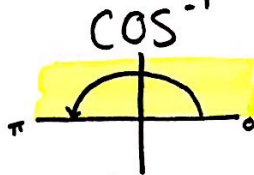
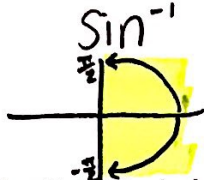


**DEFINITION:** The inverse tangent function, denoted by  $\tan^{-1} x$  (or  $\arctan x$ ), is defined to be the inverse of the restricted tangent function

$$\tan x, \quad -\frac{\pi}{2} < x < \frac{\pi}{2}$$



FUNCTION	DOMAIN	RANGE
$\sin^{-1} x$	$[-1, 1]$	$[-\pi/2, \pi/2]$
$\cos^{-1} x$	$[-1, 1]$	$[0, \pi]$
$\tan^{-1} x$	$(-\infty, +\infty)$	$(-\pi/2, \pi/2)$



Use the Unit Circle to find the angle measures that would correctly fill in the blank.

1.  $\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$

4.  $\cos 0 = 1$

7.  $\sin 0 = 0$

2.  $\cos \frac{2\pi}{3} = -\frac{1}{2}$

5.  $\tan \frac{-\pi}{3} = -\sqrt{3}$

8.  $\cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$

3.  $\tan \frac{-\pi}{4} = -1$

6.  $\tan \frac{\pi}{6} = \frac{\sqrt{3}}{3}$

9.  $\sin \frac{3\pi}{2} = -1$

In each problem, find the value of  $\theta$ .

10.  $\sin \theta = 1$   
 $\sin^{-1}(\sin \theta) = \sin^{-1}(1)$   
 $\theta = \frac{\pi}{2}$

13.  $\tan \theta = 1$   
 $\arctan(\tan \theta) = \arctan(1)$   
 $\theta = \frac{\pi}{4}$

11.  $\sin \theta = \frac{1}{2}$

14.  $\tan \theta = \frac{\sqrt{3}}{3}$

$\arcsin(\sin \theta) = \arcsin(\frac{1}{2})$   
 $\theta = \frac{\pi}{6}$

$\tan^{-1}(\tan \theta) = \tan^{-1}(\frac{\sqrt{3}}{3})$   
 $\theta = \frac{\pi}{6}$

12.  $\sin \theta = -\frac{\sqrt{2}}{2}$

15.  $\sin \theta = -\frac{\sqrt{3}}{2}$

$\sin^{-1}(\sin \theta) = \sin^{-1}(-\frac{\sqrt{2}}{2})$   
 $\theta = -\frac{\pi}{4}$

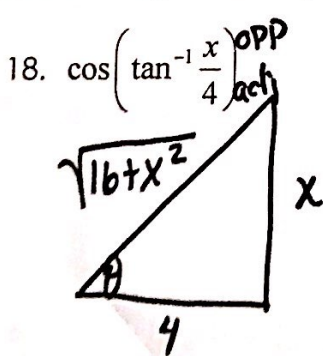
$\sin^{-1}(\sin \theta) = \sin^{-1}(-\frac{\sqrt{3}}{2})$   
 $\theta = -\frac{\pi}{3}$

Find the exact value.

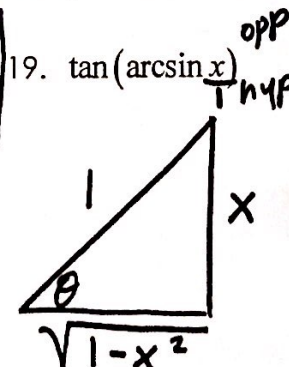
16.  $\sin(\cos^{-1} \frac{\sqrt{2}}{2})$   
 $\sin(\frac{3\pi}{4}) = \frac{\sqrt{2}}{2}$

17.  $\tan^{-1}(\sin \frac{3\pi}{2})$   
 $\tan^{-1}(-1) = -\frac{\pi}{4}$

Find an algebraic expression equivalent to the given expression.



$\cos \theta = \frac{4}{\sqrt{16+x^2}}$  or  $\frac{4\sqrt{16+x^2}}{16+x^2}$



$\tan \theta = \frac{x}{\sqrt{1-x^2}}$   
 or  $\frac{x\sqrt{1-x^2}}{1-x^2}$