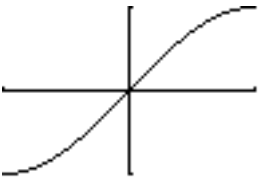
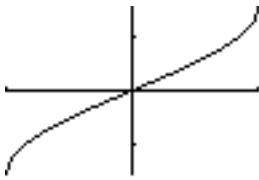
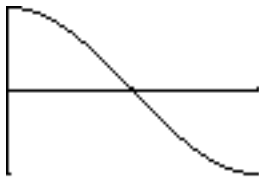
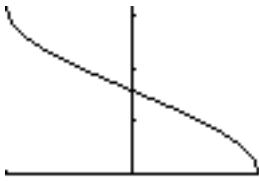
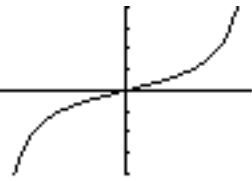
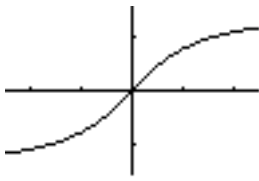


## §8.1 Inverse Trigonometric Functions

- the function  $y = \sin x$  is not one-to-one since its graph fails the horizontal line test
- by restricting the domain of  $y = \sin x$  to  $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$  it is one-to-one and has an inverse function  $y = \arcsin x$

Function	Inverse Function	Restrictions
		$y = \arcsin x$ $x = \sin y$ $-1 \leq x \leq 1$ (domain) $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$ (range)
		$y = \arccos x$ $x = \cos y$ $-1 \leq x \leq 1$ (domain) $0 \leq y \leq \pi$ (range)
		$y = \arctan x$ $x = \tan y$ $-\infty < x < \infty$ (domain) $-\frac{\pi}{2} < y < \frac{\pi}{2}$ (range)

Note: Another notation for  $y = \arcsin x$  is

$$\sin^{-1}x \neq \frac{1}{\sin x} = (\sin x)^{-1}$$

Note: in  $y = \sin^{-1}x$ ,  $y$  is the angle in  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$  whose sine is  $x$

Example 1 Evaluate.

a.)  $\arcsin(-1)$

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

c.)  $\sin^{-1}(2)$

Example 2 Evaluate.

a.)  $\cos^{-1}(-1)$

b.)  $\arccos\left(\frac{-\sqrt{2}}{2}\right)$

c.)  $\arctan(1)$

Example 3 Evaluate. (use calculator)

a.)  $\tan^{-1}(-8.45)$

b.)  $\sin^{-1}(0.2447)$

c.)  $\arccos(2)$

## Compositions of Functions

If possible find the exact value.

Example 4 Find the radian value to three decimal places.

a.)  $\tan[\arctan(-5)]$       b.)  $\arcsin\left(\sin\frac{5\pi}{3}\right)$       c.)  $\cos(\cos^{-1}\pi)$

Example 5 Evaluate.

a.)  $\tan\left(\arccos\frac{2}{3}\right)$       b.)  $\cos\left[\arcsin\left(\frac{-3}{5}\right)\right]$