

## Section 1.5: Inverse Trigonometric Functions

**Definition:** A function is a rule that assigns to each element in set A exactly one element in set B. Set A is called the **domain**. The **range** of  $f$  is the set of all possible values of  $f(x)$  where  $x$  is in the domain, i.e.  $\text{range} = \{f(x)|x \in A\}$ .

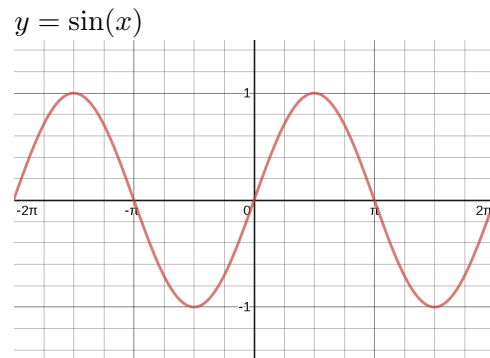
Example: Find the domain of  $f(x) = \frac{x}{x^2 - 25}$

**Definition:** A function is said to be **one-to-one** if it never takes on the same function value more than once. i.e. if  $x_1 \neq x_2$  then  $f(x_1) \neq f(x_2)$ .

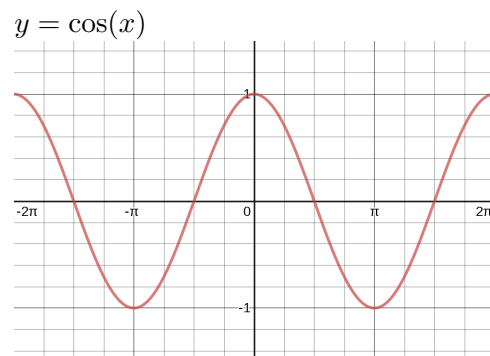
**Definition:** Let  $f$  be a one-to-one function with domain A and range B. Then its **inverse function**  $f^{-1}$  has domain B and range A and is defined, for any  $y$  in B, by

$$f^{-1}(y) = x \Leftrightarrow f(x) = y$$

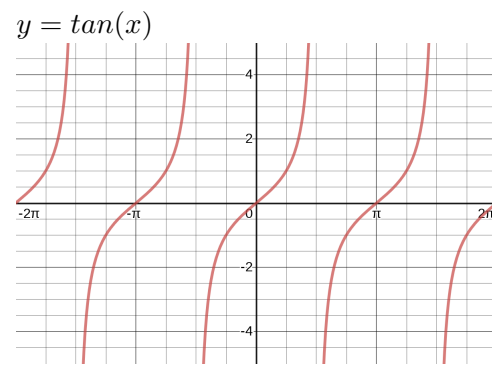
$$y = \arcsin(x) = \sin^{-1}(x)$$



$$y = \arccos(x) = \cos^{-1}(x)$$



$$y = \arctan(x) = \tan^{-1}(x)$$



Example: Find the exact value of the expression.

A)  $\cos^{-1}\left(\frac{-1}{2}\right) =$

B)  $\arcsin\left(\sin \frac{5\pi}{4}\right) =$

$$\text{C) } \arccos\left(\cos\frac{5\pi}{4}\right) =$$

$$\text{D) } \cos\left(\sin^{-1}\left(\frac{1}{2}\right)\right) =$$

$$\text{E) } \sec\left(\tan^{-1}\left(\frac{-2}{3}\right)\right) =$$

$$\text{F) } \sin(\tan^{-1}(x)) =$$

$$\text{G) } \cos\left(\sin^{-1}\left(\frac{x}{5}\right)\right) =$$