

## Domain and Range of Trig and Inverse Trig Functions



## Preliminaries and Objectives

Preliminaries:

- Graphs of  $y = \sin x$ ,  $y = \cos x$  and  $y = \tan x$ .

Objectives:

- Find the domain and range of basic trig and inverse trig functions.

## Domain and Range of General Functions

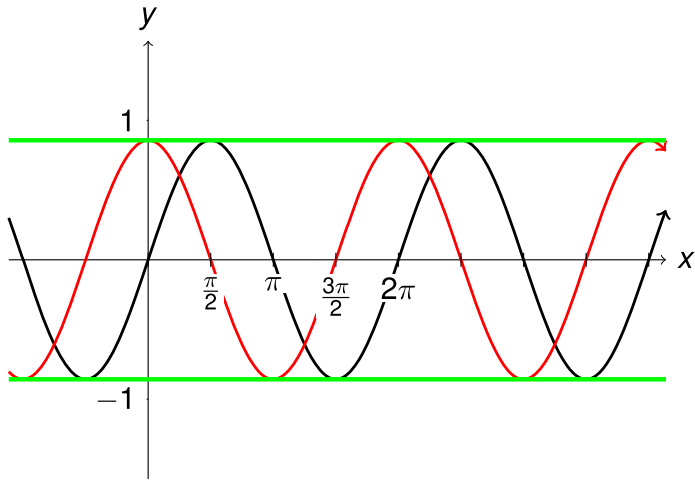
- The **domain** of a function is the list of all possible inputs (x-values) to the function.
- The **range** of a function is the list of all possible outputs (y-values) of the function.
- Graphically speaking, the domain is the portion of the x-axis on which the graph casts a shadow.
- Graphically speaking, the range is the portion of the y-axis on which the graph casts a shadow.

## Domain and Range

| <i>Function</i>    | <i>Domain</i>  | <i>Range</i>                               |
|--------------------|--|--|
| $y = \sin(x)$      | $-\infty < x < \infty$   | $-1 \leq y \leq 1$                         |
| $y = \cos(x)$      | $-\infty < x < \infty$   | $-1 \leq y \leq 1$                         |
| $y = \tan(x)$      | $x \neq \dots -\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2} \dots$ | $-\infty < y < \infty$                     |
| $y = \sin^{-1}(x)$ | $-1 \leq x \leq 1$   | $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$ |
| $y = \cos^{-1}(x)$ | $-1 \leq x \leq 1$   | $0 \leq y \leq \pi$                        |
| $y = \tan^{-1}(x)$ | $-\infty < x < \infty$   | $-\frac{\pi}{2} < y < \frac{\pi}{2}$       |

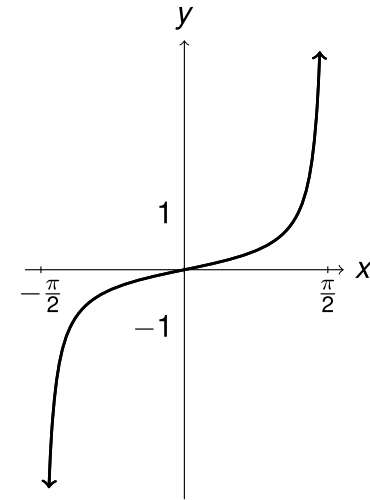
## Domain, Range and Graphs

$$y = \sin x \quad y = \cos x$$



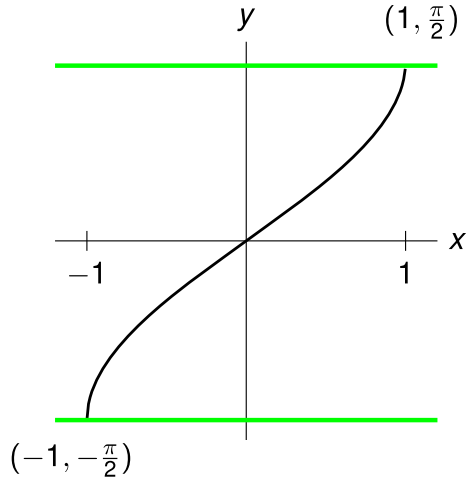
## Domain, Range and Graphs

$$y = \tan x$$



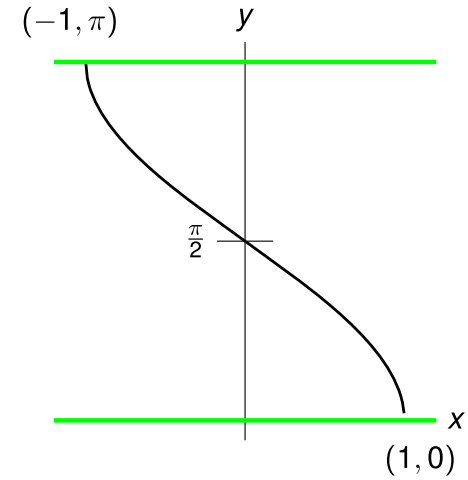
## Domain, Range and Graphs

$$y = \sin^{-1} x$$



## Domain, Range and Graphs

$$y = \cos^{-1} x$$



## Domain, Range and Graphs

$$y = \tan^{-1} x$$

