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

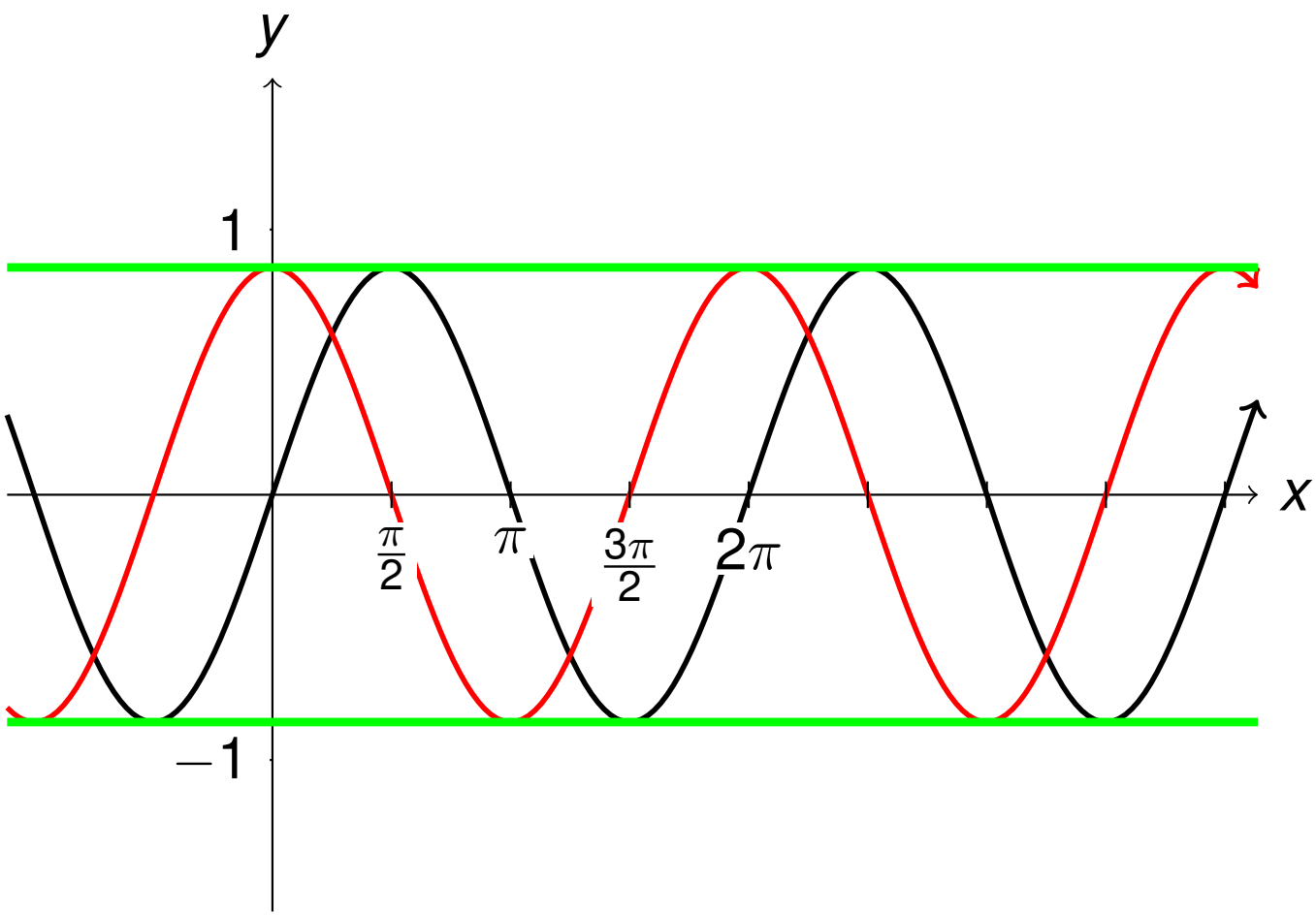
- The **domain** of a function is the list of all possible inputs (x-values) to the function.
- The **range** of a function is the list of all possible outputs (y-values) of the function.
- Graphically speaking, the domain is the portion of the x-axis on which the graph casts a shadow.
- Graphically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

Domain and Range

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

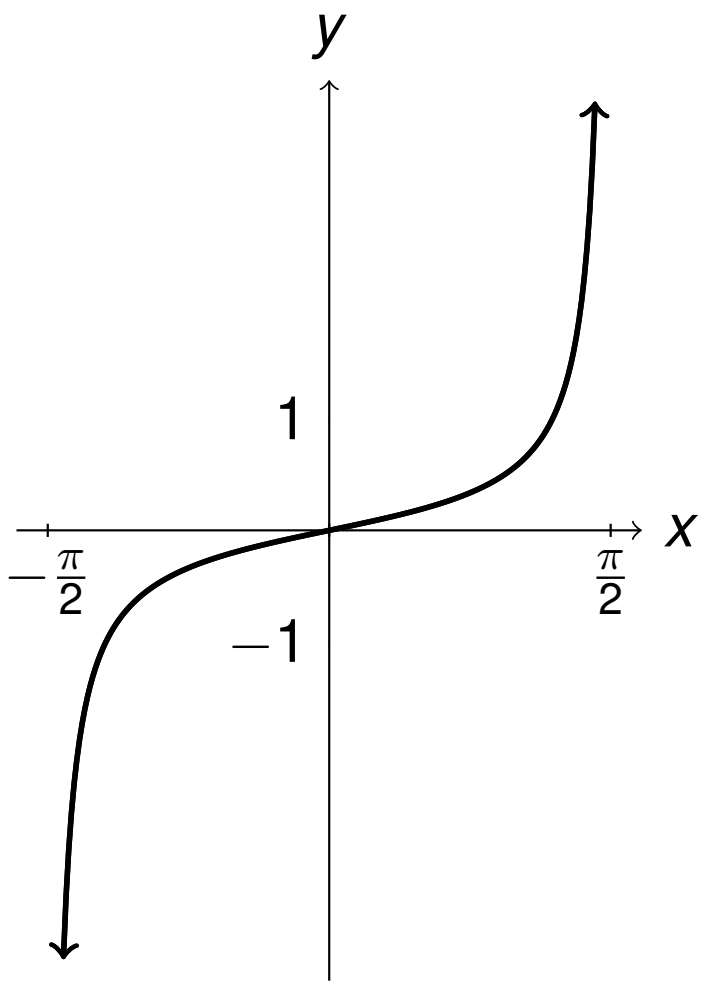
Domain, Range and Graphs

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



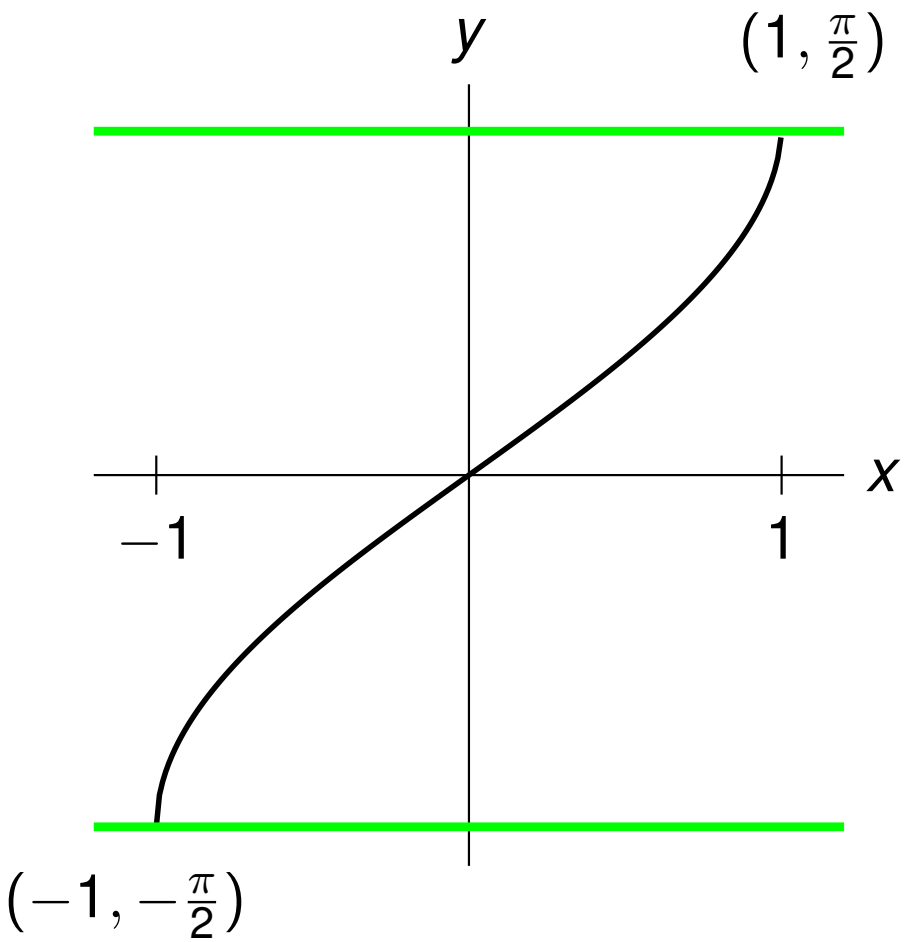
Domain, Range and Graphs

$$y = \tan x$$



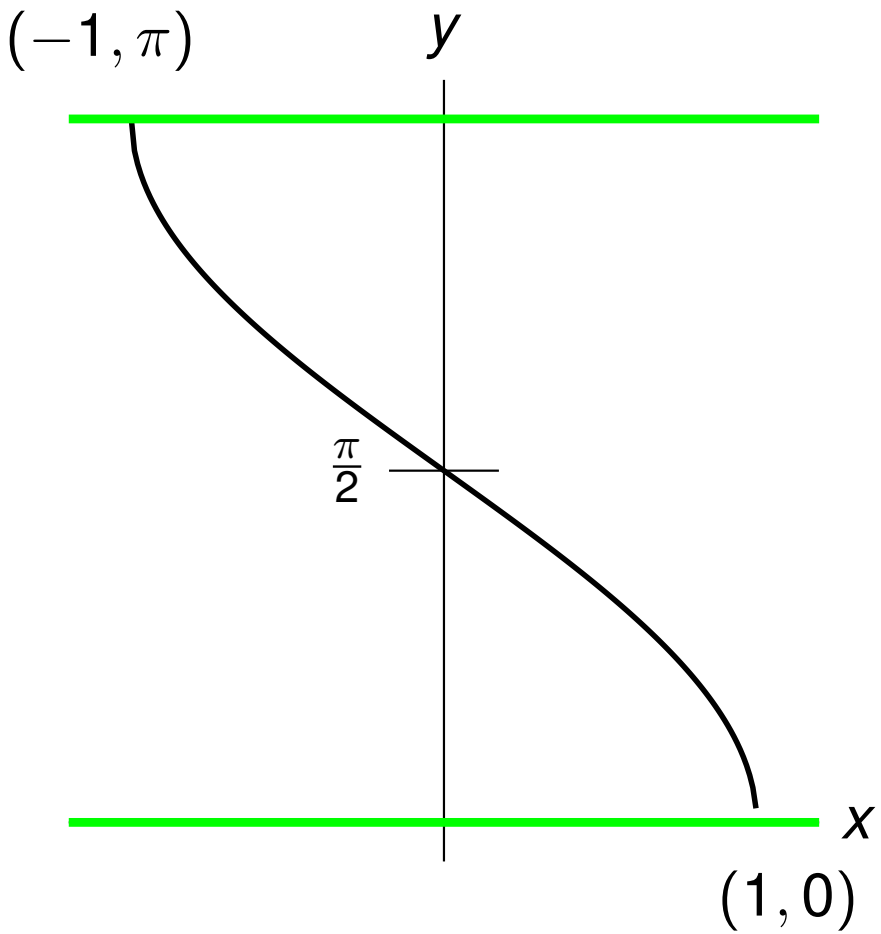
Domain, Range and Graphs

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



Domain, Range and Graphs

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



Domain, Range and Graphs

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