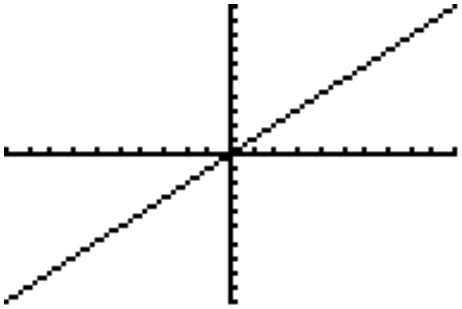
Identity Function

$f(x) = x$



Domain : $(-\infty, \infty)$

Range : $(-\infty, \infty)$

Zeros : $x = 0$

x - intercept : $(0,0)$

y - intercept : $(0,0)$

Horizontal Asymptote: none

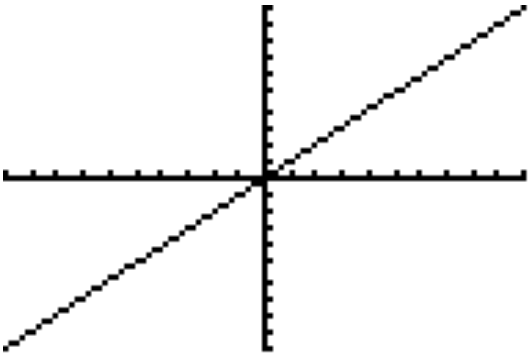
Vertical Asymptote: none

Odd Function

Symmetric with the origin

Increasing: $(-\infty, \infty)$

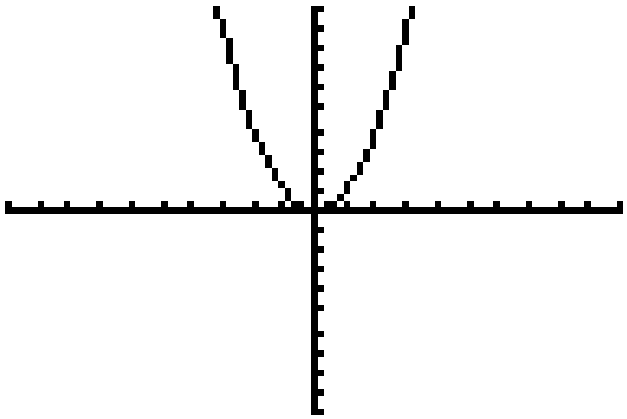
One to one Function



Inverse $f^{-1}(x) = x$

Square Function

$f(x) = x^2$



$Domain: (-\infty, \infty)$

$Range: [0, \infty)$

$zeros: x = 0$ double root

$x\text{-}intercept: (0,0)$

$y\text{-}intercept: (0,0)$

Horizontal Asymptote: none

Vertical Asymptote: none

Vertex $(0,0)$

axis of symmetry: $x = 0$

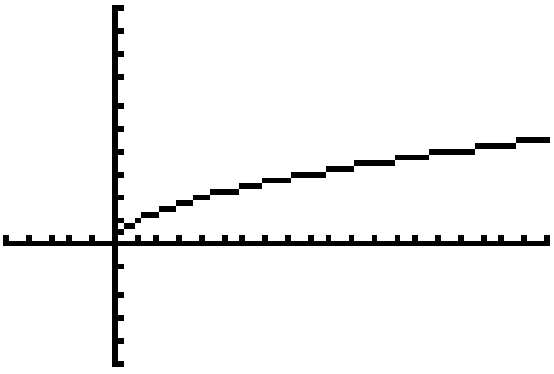
Even function

Symmetric with y-axis

Decreasing: $(-\infty, 0)$

Increasing: $(0, \infty)$

Not a one-to-one function

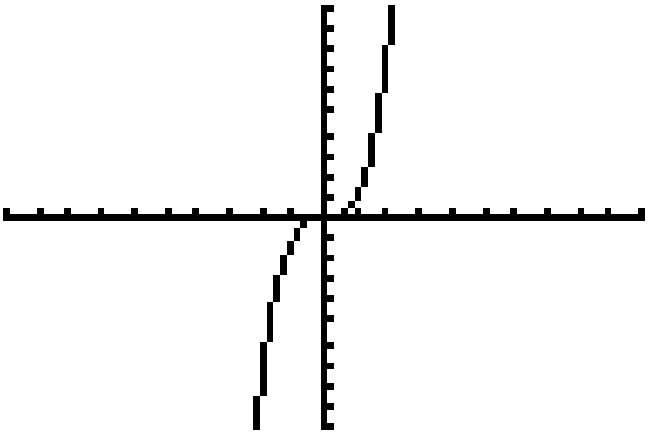


Inverse: $f^{-1}(x) = \sqrt{x}$

Must restrict the domain of $f(x)$ to $[0, \infty)$ so the inverse is a function

Cube Function

$$f(x) = x^3$$



$Domain: (-\infty, \infty)$

$Range: (-\infty, \infty)$

$zeros: x = 0$ triple root

$x\text{-}intercept: (0,0)$

$y\text{-}intercept: (0,0)$

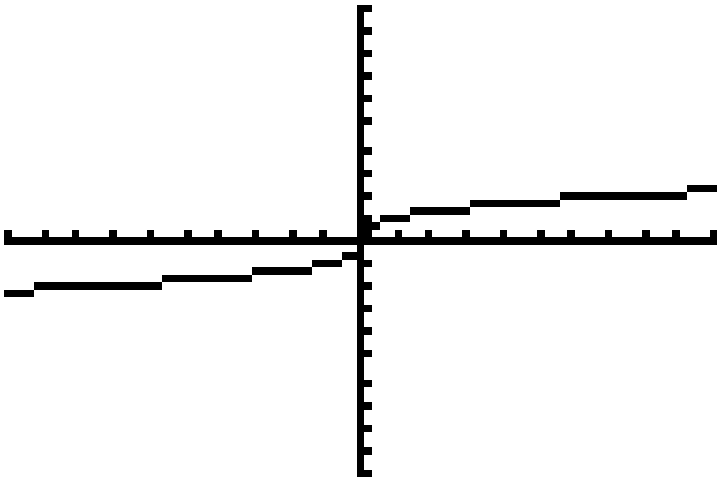
Horizontal Asymptote: none

Vertical Asymptote: none

Odd Function

Symmetric with origin

Increasing: $(-\infty, \infty)$



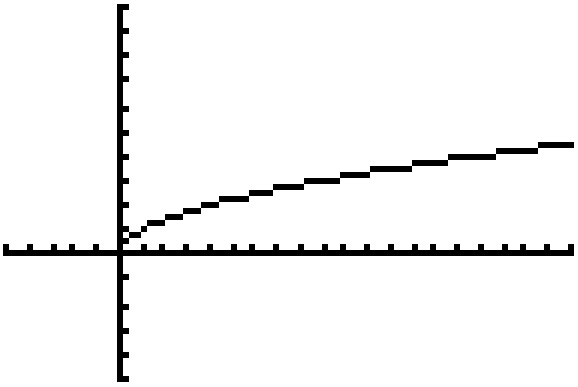
Inverse: $f^{-1}(x) = \sqrt[3]{x}$

$Domain: (-\infty, \infty)$

$Range: (-\infty, \infty)$

Square Root Function

$$f(x) = \sqrt{x}$$



$Domain: [0, \infty)$

$Range: [0, \infty)$

$zeros: x = 0$

$x\text{-}intercept: (0,0)$

$y\text{-}intercept: (0,0)$

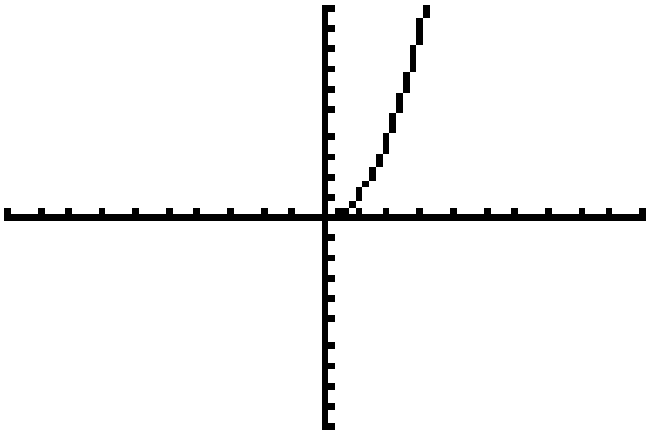
Horizontal Asymptote: none

Vertical Asymptote: none

No Symmetry

Increasing: $(0, \infty)$

One-to-one function



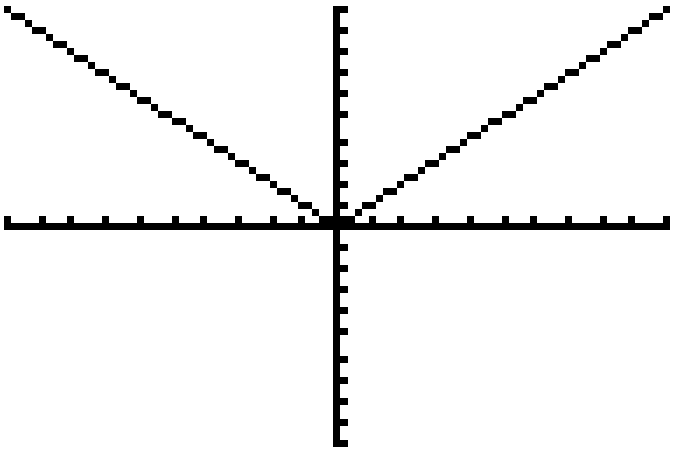
Inverse: $f^{-1}(x) = x^2$

$Domain: [0, \infty)$

$Range: [0, \infty)$

Absolute Value Function

$$f(x) = |x|$$



$Domain: (-\infty, \infty)$

$Range: [0, \infty)$

$zeros: x = 0$

$x\text{-}intercept: (0,0)$

$y\text{-}intercept: (0,0)$

Horizontal Asymptote: none

Vertical Asymptote: none

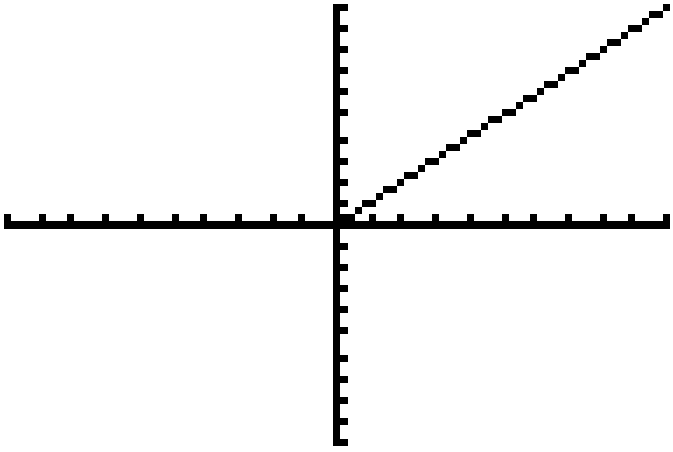
Even Function

Symmetric with y-axis

Decreasing $(-\infty, 0)$

Increasing: $(0, \infty)$

Not a one-to-one function



Inverse: $f^{-1}(x) = |x|$ if $x \geq 0$

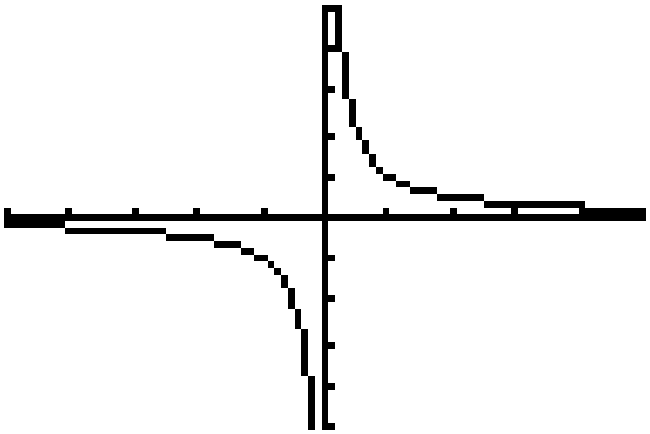
(must restrict the domain of $f(x)$

$Domain: [0, \infty)$

$Range: [0, \infty)$

Reciprocal Function

$$f(x)=\frac{1}{x}$$



Domain : $(-\infty,0)\cup(0,\infty)$

Range : $(-\infty,0)\cup(0,\infty)$

zeros : *none*

x - intercept : none

y - intercept : none

Horizontal Asymptote: $y=0$

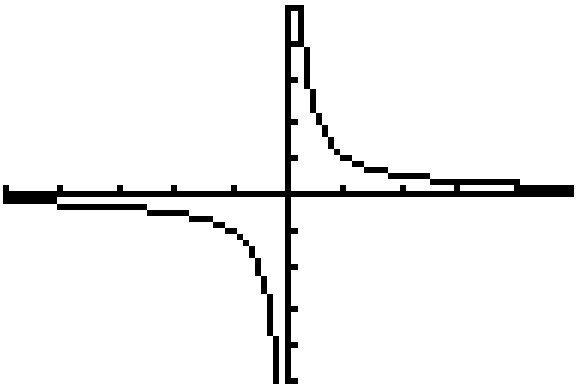
Vertical Asymptote: $x=0$

Odd Function

Symmetric with origin

Symmetric with line $y=x$.

One-to-one function



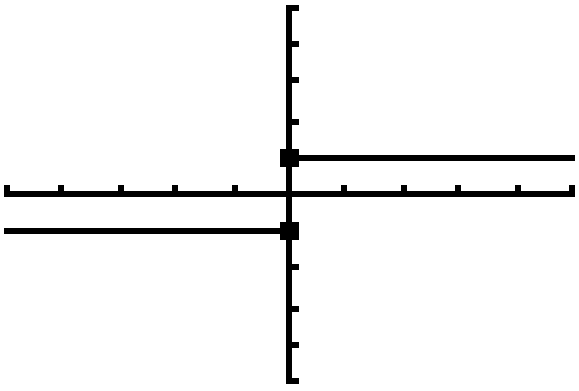
Inverse: $f^{-1}(x)=\frac{1}{x}$

Domain : $(-\infty,0)\cup(0,\infty)$

Range : $(-\infty,0)\cup(0,\infty)$

Egyptian Function

$$f(x)=\frac{|x|}{x}$$



Domain : $(-\infty,0)\cup(0,\infty)$

Range : $y=\pm 1$

zeros : *none*

x - intercept : none

y - intercept : none

Horizontal Asymptote: *none*

Vertical Asymptote: *none*

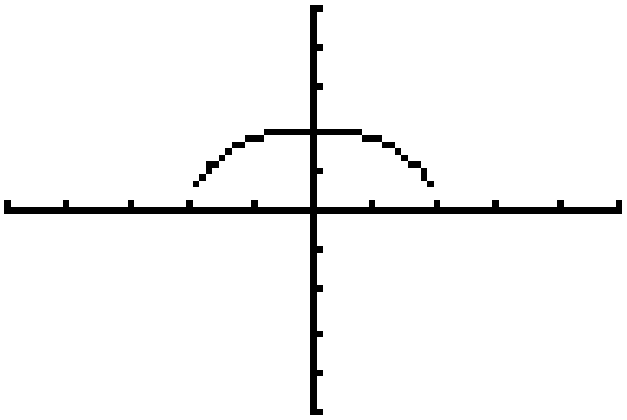
Symmetric with origin.

Not one-to-one function.

Odd function

Half Circle

$$f(x)=\sqrt{r^2-x^2}$$



$Domain:[-r,r]$

$Range:[0,r]$

$zeros:\pm r$

$x\text{-}intercept:(r,0)\cup(-r,0)$

$y\text{-}intercept:(0,r)$

Horizontal Asymptote: *none*

Vertical Asymptote: *none*

Even Function

Symmetric with y-axis

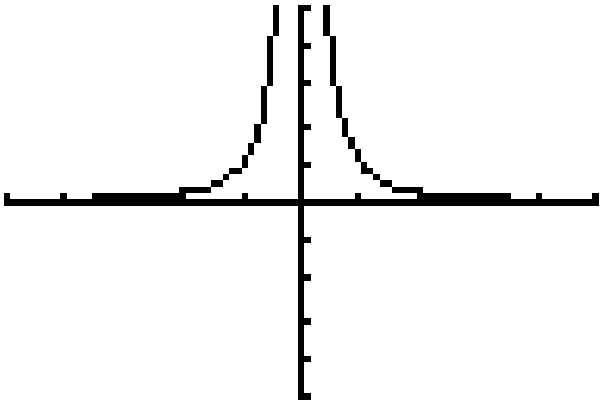
Not one-to-one function.

Increasing: $(-r,0)$

Decreasing: $(0,r)$

Volcano Function

$$f(x)=\frac{1}{x^2}$$



Domain : $(-\infty,0)\cup(0,\infty)$

Range : $(0,\infty)$

zeros : *none*

x - intercept : none

y - intercept : none

Horizontal Asymptote: $y=0$

Vertical Asymptote: $x=0$

Even Function

Symmetric with y-axis

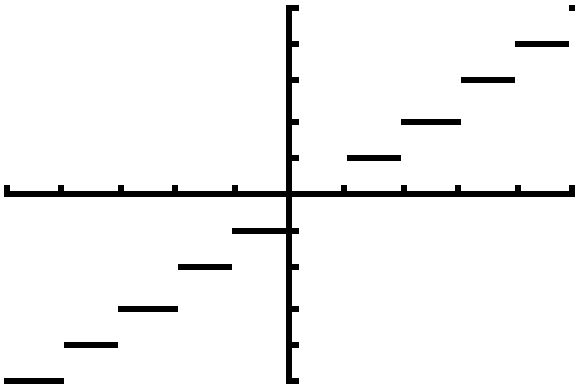
Increasing $(-\infty,0)$

Decreasing: $(0,\infty)$

Not a one-to-one function

Step Function (Greatest Integer Function)

$$f(x) = [x]$$



Domain : $(-\infty, \infty)$

Range : All Real Integers

zeros : $[0,1)$

x - intercept : $[0,1)$

y - intercept : $(0,0)$

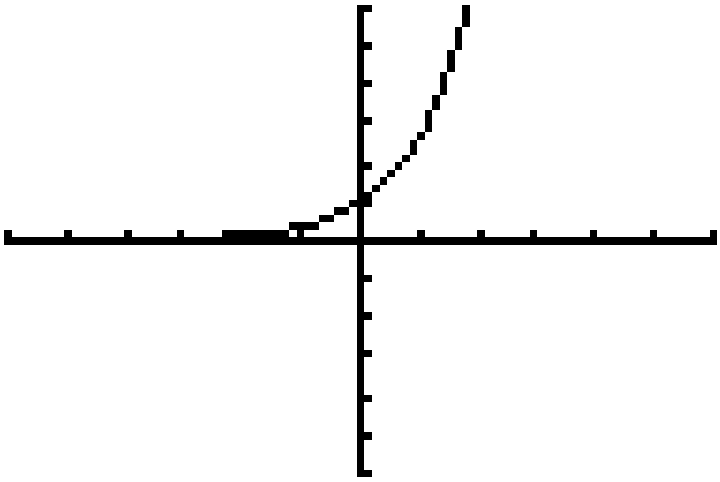
Horizontal Asymptote: none

Vertical Asymptote: none

No symmetry

Not a one-to-one function

Exponential Function



$f(x) = a^x$, where $a > 1$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

zeros: none

x-intercept: none

y-intercept: $(0,1)$

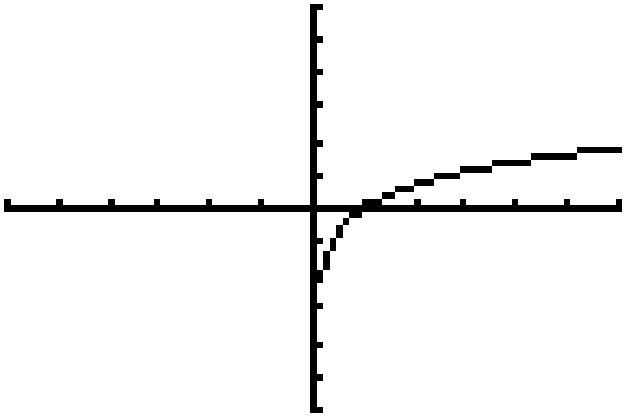
HA: $y = 0$, VA: none

Increasing function

No Symmetry

One-to-One Function

Inverse:



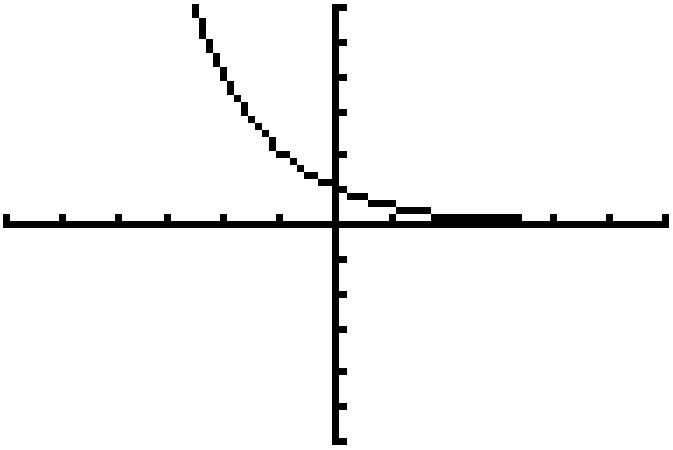
$y = \log_a x$

Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

$x-$intercept: $(1,0)$

Exponential Function



$f(x) = a^x$, where $0 < a < 1$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

zeros: none

x-intercept: none

y-intercept: $(0,1)$

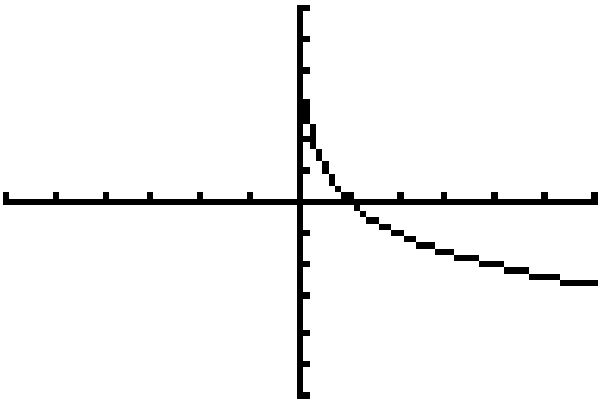
HA: $y = 0$, VA: none

Decreasing Function

No Symmetry

One-to-One Function

Inverse:



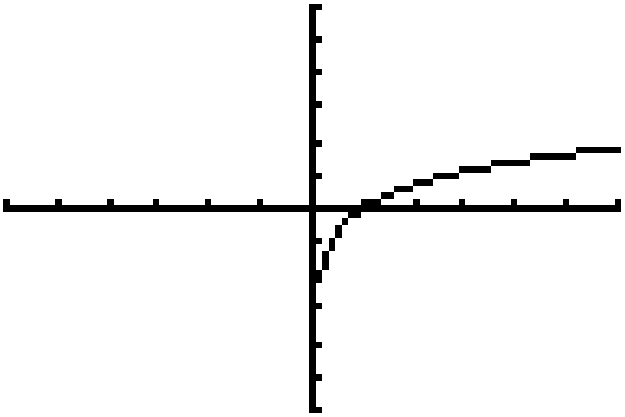
$y = \log_a x$, where $0 < a < 1$

Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

$x-$intercept : $(1,0)$

Logarithmic Function



$f(x) = \log_b x$, where $b > 1$

Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

zeros: $x = 1$

$x-$intercept: $(1,0)$

$y-$intercept: none

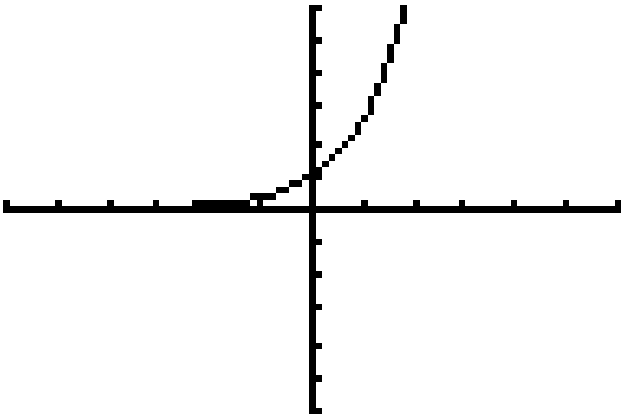
HA: none, VA: $x = 0$

Increasing Function

No Symmetry

One-to-One Function

Inverse:



$y = b^x$, where $b > 1$

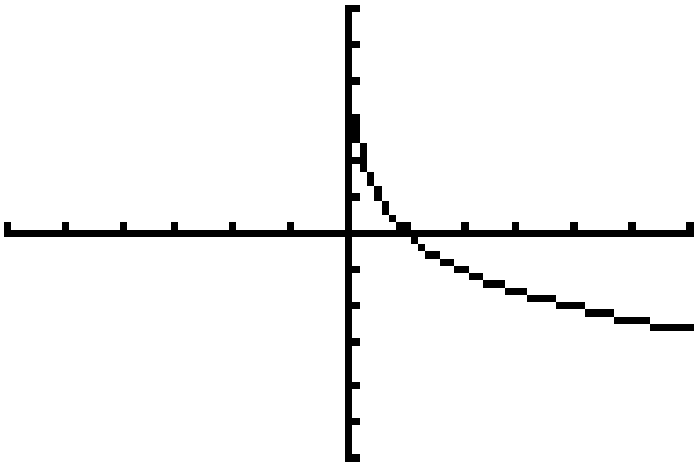
Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

$x-$*intercept*: none

y-intercept: $(0,1)$

Logarithmic Function:



$f(x) = \log_b x$, where $0 < b < 1$

Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

zeros: $x = 1$

$x-$intercept: $(1, 0)$

$y-$intercept: none

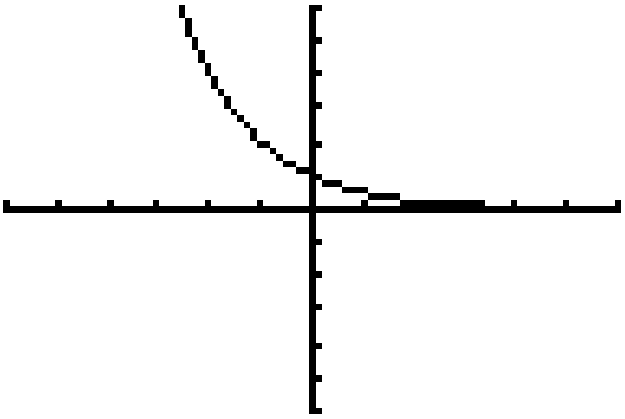
HA: none, VA: $x = 0$

Decreasing Function

No Symmetry

One-to-One Function

Inverse:

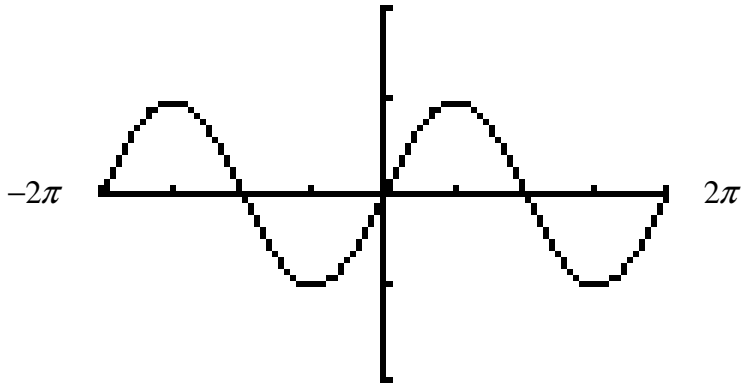


$y = b^x$, where $0 < b < 1$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

$y-$*intercept*: $(0, 1)$



$f(x) = \sin x$

Domain: $(-\infty, \infty)$

Range: $(-1,1)$

ODD Function: $\sin(-x) = -\sin(x)$

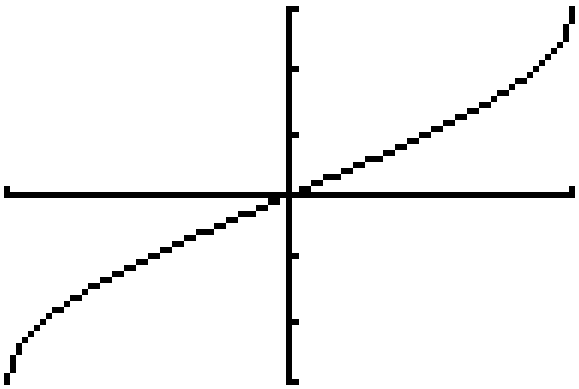
Period : 2π

$x-$intercept : multiples of π

y-intercept: $(0,0)$

$one-to-one$

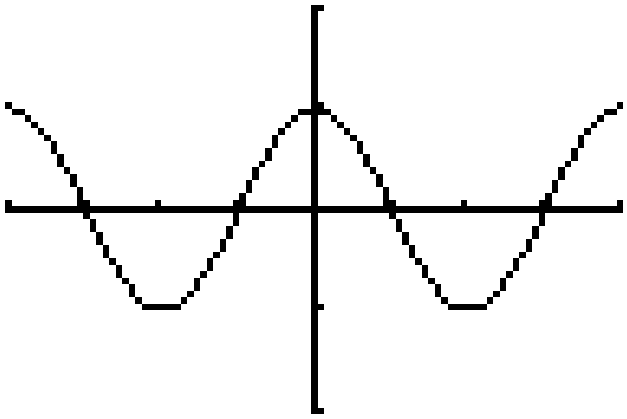
Inverse:



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

Domain: $[-1,1]$

Range: $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$



$f(x) = \cos(x)$

Domain: $(-\infty, \infty)$

Range: $[-1,1]$

Period: 2π

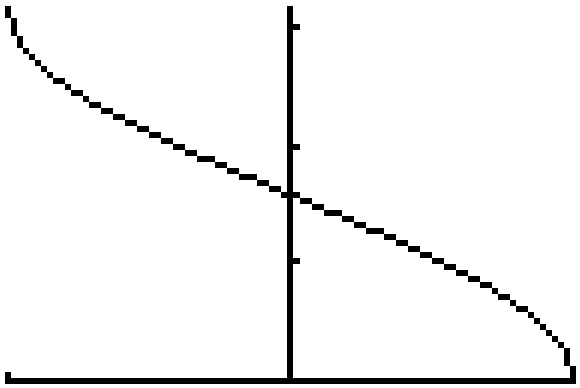
x-intercepts: odd multiples of $\frac{\pi}{2}$

$y-$intercept : $(0,1)$

EVEN function: $\cos(-x) = \cos(x)$

not one-to-one

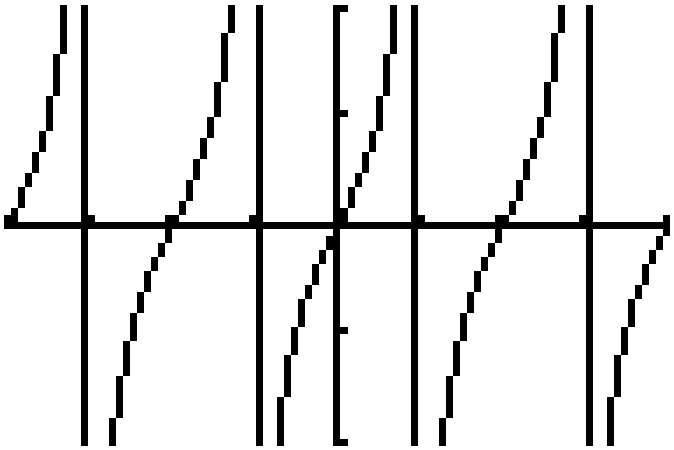
Inverse:



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

Domain: $[-1,1]$

Range: $[0,\pi]$



$f(x) = \tan x$

Domain: All reals except odd multiples of $\frac{\pi}{2}$

Range: $(-\infty, \infty)$

Odd: $\tan(-x) = -\tan x$

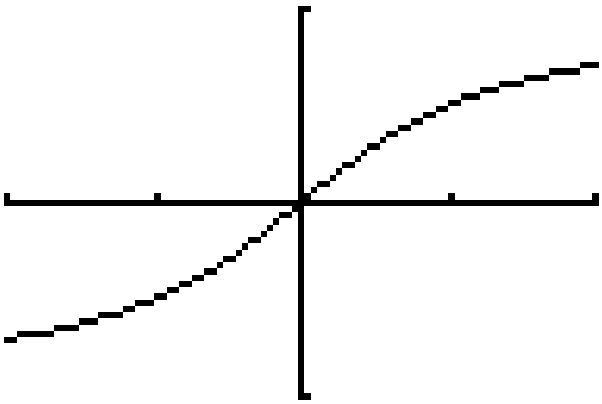
Period: π

x-intercepts: multiples of π

y-intercept: $(0,0)$

VA: odd multiples of $\frac{\pi}{2}$

Inverse:

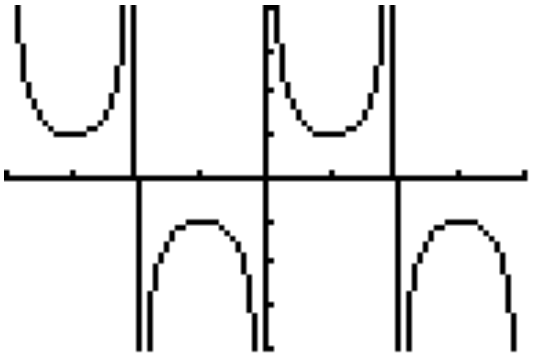


$$f(x) = \tan^{-1} x$$

$$\text{Domain: } (-\infty, \infty)$$

$$\text{Range: } \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$$

Reciprocal Trig Functions



$f(x) = \csc x = \dfrac{1}{\sin x}$

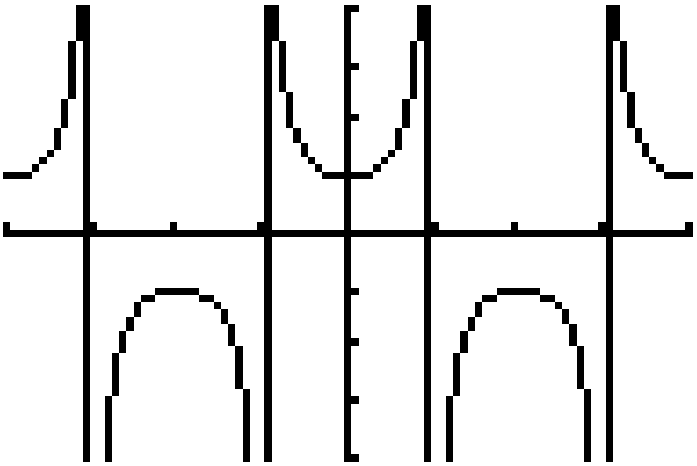
Domain: All reals except multiples of π

Range: $(-\infty, -1] \cup [1, \infty)$

VA: multiples of π

Period: 2π

No intercepts



$f(x) = \sec x = \dfrac{1}{\cos x}$

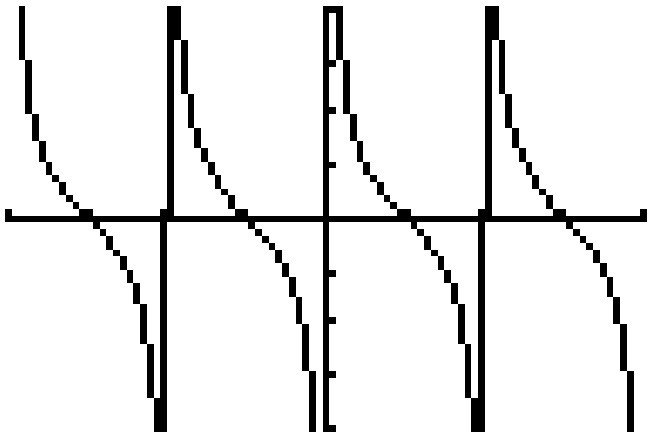
Domain: all reals except odd multiples of $\dfrac{\pi}{2}$

Range: $(-\infty, 1] \cup [1, \infty)$

VA: odd multiples of $\dfrac{\pi}{2}$

Period: 2π

y-intercept: $(0,1)$



$f(x) = \cot x = \dfrac{1}{\tan x}$

Domain: all reals except multiples of π

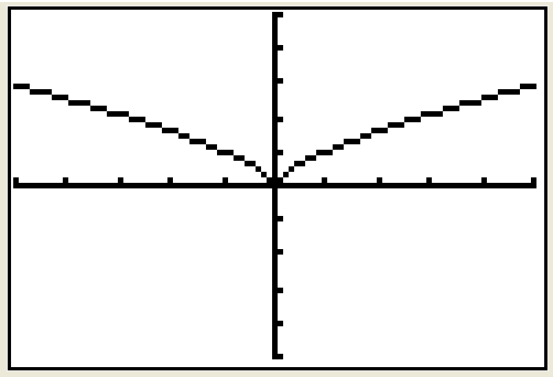
Range: All reals

x-intercept: odd multiples of $\dfrac{\pi}{2}$

VA: multiples of π

The Seagull

$f(x) = x^{2/3}$



$f(x) = x^{2/3}$

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

Even Function

$x-$intercept: $(0,0)$

y-intercept: $(0,0)$