ALGEBRA

DOMAIN AND RANGE

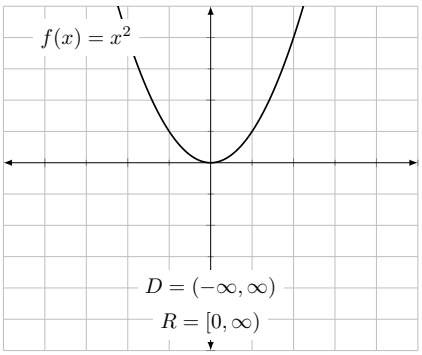
DOMAIN (Input)	**RANGE** (Output)
The complete set of possible values of the independent variable x.	The set of y-values obtained from the values in the domain.

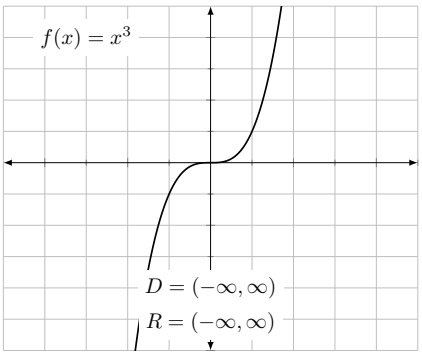
FUNCTION NAME	**FUNCTION FORM**	**DOMAIN**
POLYNOMIAL	$f(x) = a_1x^n + a_2x^{n-1} + a_3x^{n-2} + \dots$	All real numbers. $(-\infty, \infty)$
RATIONAL	$f(x) = \dfrac{a_1x^m + a_2x^{m-1} + a_3x^{m-2} + \dots}{b_1x^n + b_2x^{n-1} + b_3x^{n-2} + \dots}$	All real numbers, except those that make the denominator zero.
EVEN ROOT	$f(x) = \sqrt[n]{x}, \quad m$ is even.	All real numbers greater than or equal to zero. $[0, \infty)$
ODD ROOT	$f(x) = \sqrt[n]{x}, \quad n$ is odd.	All real numbers. $(-\infty, \infty)$
LOGARITHMIC	$f(x) = \log(x)$	All real numbers greater than zero. $(0, \infty)$
EXPONENTIAL	$f(x) = a^x$	All real numbers. $(-\infty, \infty)$

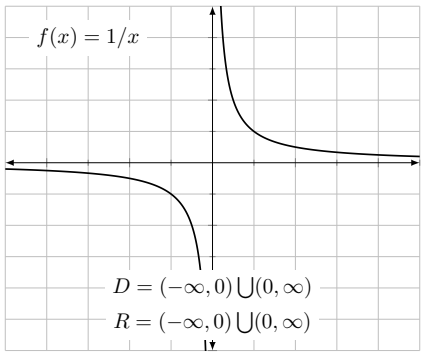
A vending machine is a function with domain and range. The domain consists of the collection of numbers that label each individual item. The range is the output that we can get from the machine, and in this case the items that we can obtain.

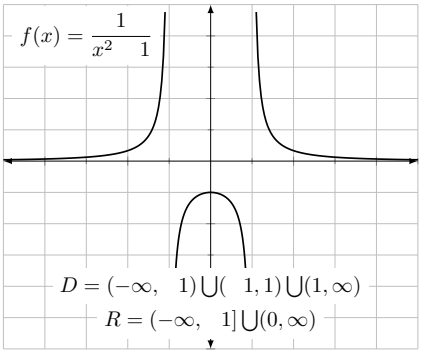
ALGEBRA

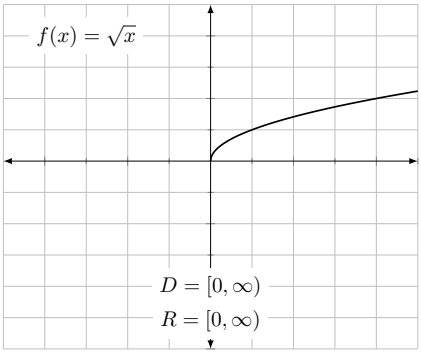
DOMAIN AND RANGE

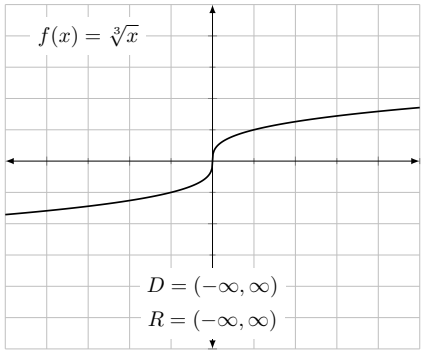


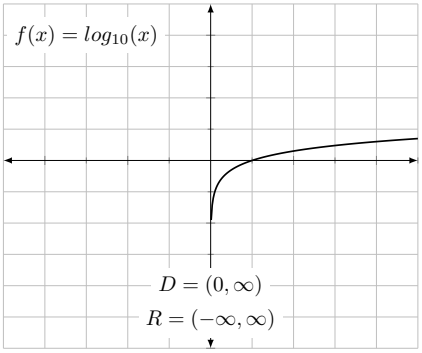


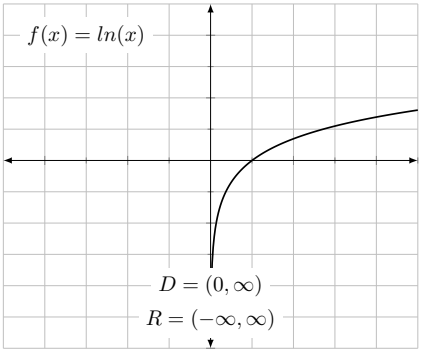


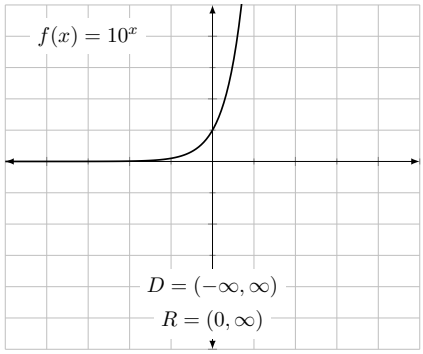












VERTICAL ASYMPTOTES OF RATIONAL FUNCTIONS

If $f(x)$ is a rational function then the **vertical asymptotes** are the values of x that make the denominator zero.

HORIZONTAL ASYMPTOTES OF RATIONAL FUNCTIONS

If $f(x)$ is a rational function of the form $f(x) = \dfrac{a_1x^m + a_2x^{m-1} + a_3x^{m-2} + \ldots}{b_1x^n + b_2x^{n-1} + b_3x^{n-2} + \ldots}$. The leading terms are a_1x^m and b_1x^n (because they have the greatest power of x) and their respective powers are m and n.

RELATION	HORIZONTAL ASYMPTOTE
$m > n$	No horizontal asymptote
$m = n$	Horizontal asymptote is the division of the leading coefficients $y = \frac{a_1}{b_1}$.
$m < n$	Horizontal asymptote is $y = 0$.