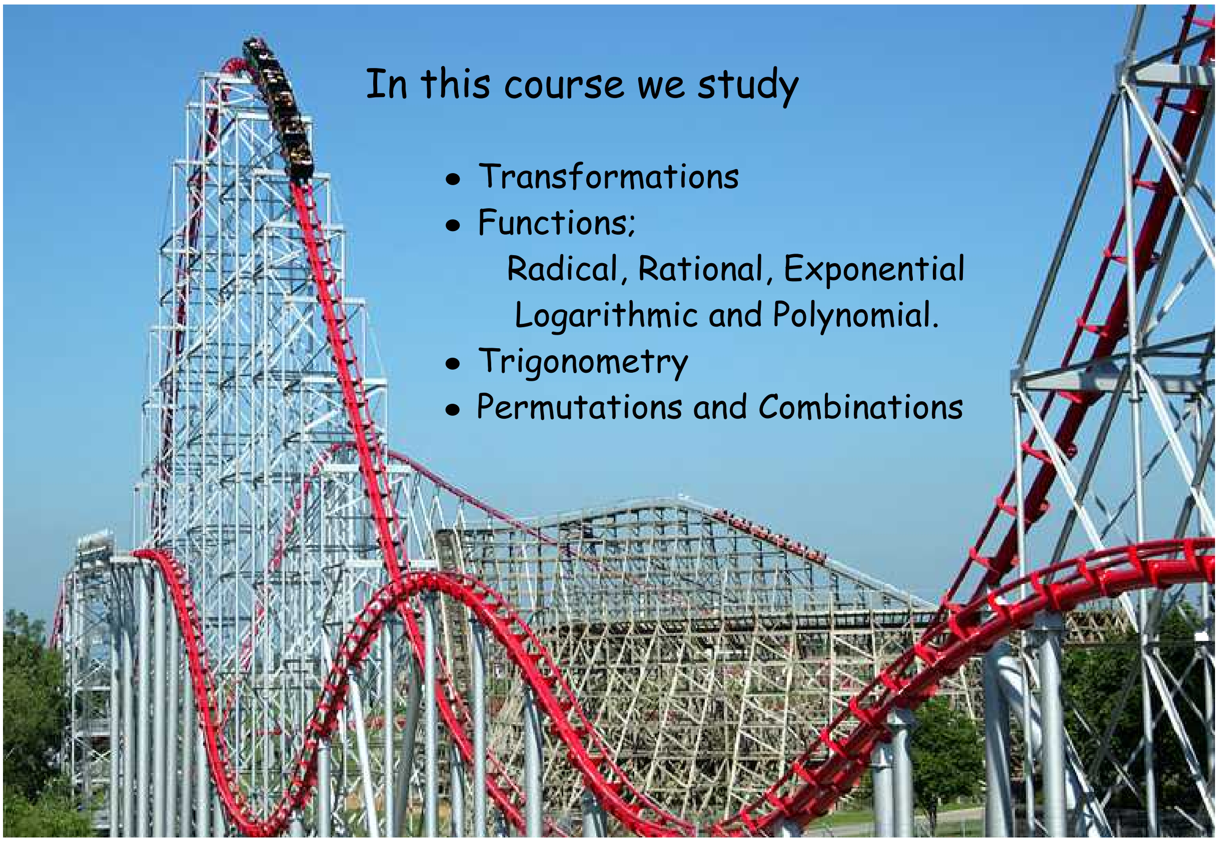
Welcome to

Math 30-1



In this course we study

- Transformations
- Functions;
  Radical, Rational, Exponential
  Logarithmic and Polynomial.
- Trigonometry
- Permutations and Combinations

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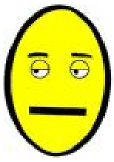
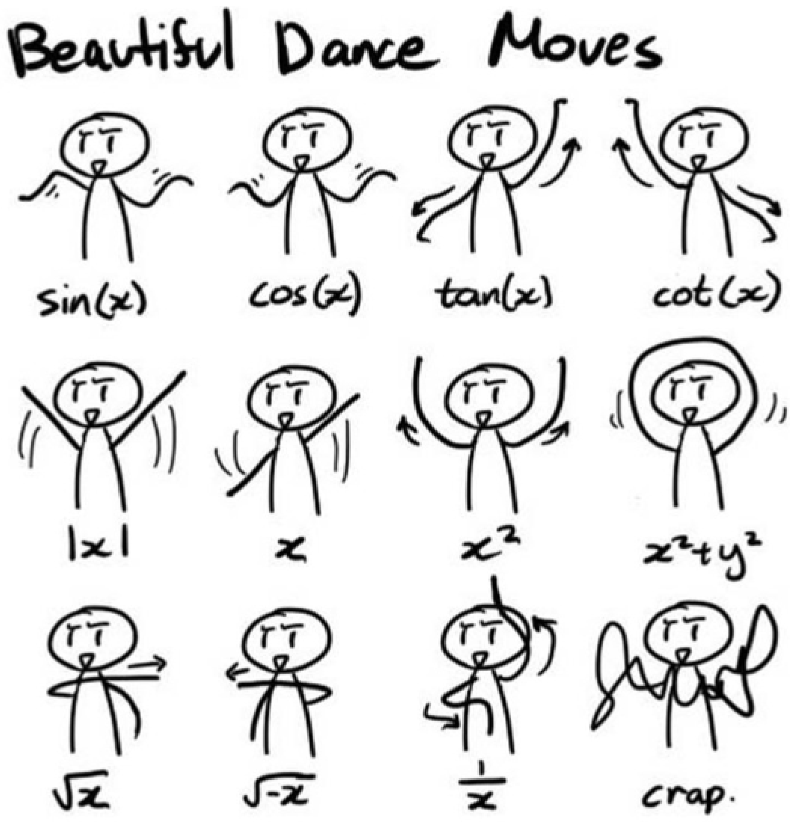


And just where am I ever going to use this???

Biology, Chemistry, Physics, Ecology, Navigation, Technology, Telecommunications, Demographics, Geography, Communication, Meteorology, Accounting, Banking, Business, Economics, Income, Retail, Inventory, Manufacturing, Health, Home Improvement, Personal Finance, Entertainment, Music, Sports, Travel, Recreation, Fundraising, Transportation, Political Science, Student Government, Investments, Payroll, Carpentry, Cooking, Fire Prevention, Landscaping, Taxes, Aviation, Government, Budgeting, Sales, Rentals, Crafts, Hobbies, Pool Maintenance, Archaeology, Packaging, Auto Racing, Gardening, Fund-Raising, Optics, Construction, Framing, Photography, Astronomy, Civil Engineering, Engineering, Mechanics, Fitness, Emergency Services, Nursing, Marketing, Scheduling, ...

...and including,...bet you never thought of this one,...

Aug 14-12:28 PM



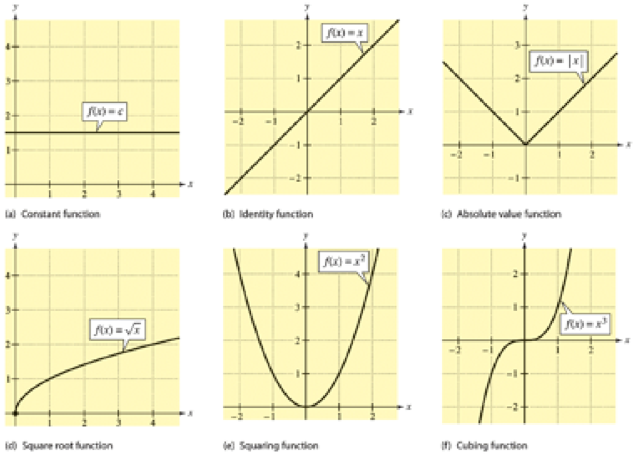
What are you planning to do?

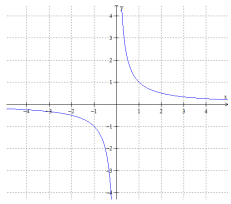
Aug 14-12:25 PM

Lesson 1: Review

Function Notation and Graphs of Functions

$f(x) = c$ $y = x$ $f(x) = |x|$ $f(x) = \frac{1}{x}$





$f(x) = \sqrt{x}$ $f(x) = x^2$ $f(x) = x^3$

Recall: Functions need to pass the Vertical Line Test

I. Graphs of Functions

Function - A rule that gives a single output (y) for every input number (x).
All functions can be entered on the graphing calculator as y = ,
and all functions have graphs that will pass the Vertical Line Test.

Domain - The set of all x-values represented by the graph or equation of the functions.

Range - The set of all y-values represented by the graph or equation of the functions.

Remember - The 'y' value may also be replaced by f(x) when function notation is used.

Let's review some basic functions and their graphs

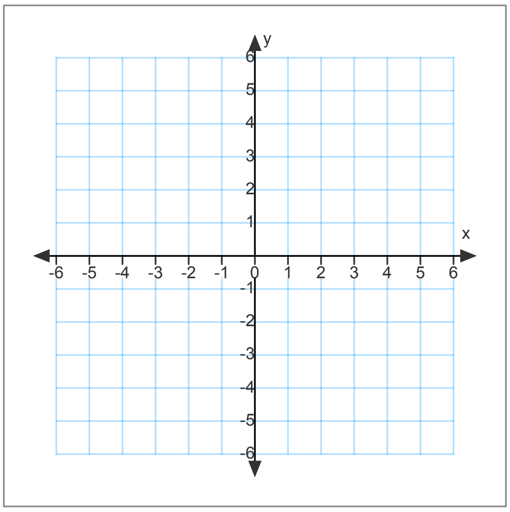
Aug 15-11:26 AM

Linear Functions - The graph is a straight line.
Basic Equation - $y = mx + b$, where 'm' is the slope and (0, b) is the y-intercept of the line.

Example: Sketch the graph of $y = -\frac{3}{4}x + 5$ on the grid below.

Graph on Calculator: $y_1 =$
2^{nd}, 'graph' for table of values

Or, Plot the y-intercept, then use the slope to plot another point



Domain:

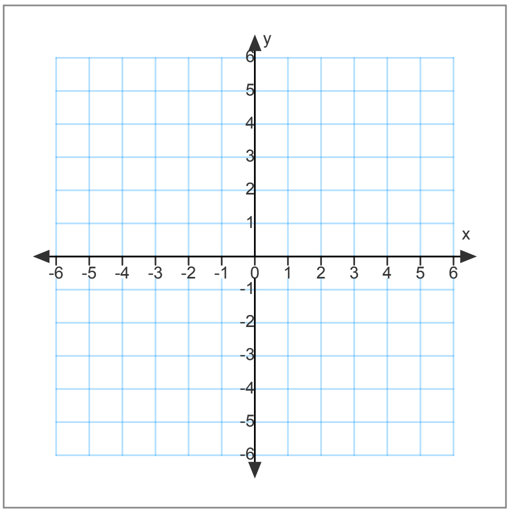
Range:

Constant Function - The graph is a horizontal line.

Basic Equation - $y = c$, This is a special form of the the linear equation, where the slope is zero, and the y-intercept is the given constant 'c'.

Example: Sketch the graph of $y = -3$ on the grid below.

A constant function is a special case of a linear function.



a. Given $f(x) = 4$ **, evaluate using the graph**

$f(2),\quad f(-3.5),\quad f(6)$

b. What is the slope of the graph?

c. What are the intercepts?

Domain: **Range:**

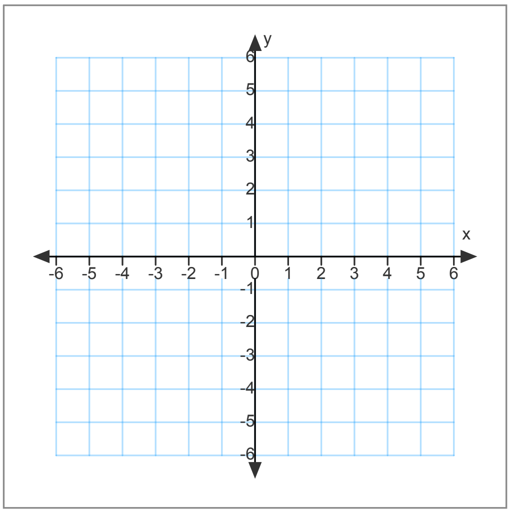
Why do you think this called the constant function?

Note: $x = c$ is a vertical line and <u>NOT</u> a function.

<u>**Identity Function**</u> - A linear function with a slope of one, and a y-intercept (0, 0).
Basic Equation - $y = x$

Example: Sketch the graph of $i(x) = x$ on the grid below.

The identity function is a special case of the linear function. It is defined as $i(x) = x$



a. Evaluate $i(3),\quad i(4.5),\quad i(-2.7)$

b. What is the slope of the graph?
c. What are the intercepts?

Domain: **Range:**

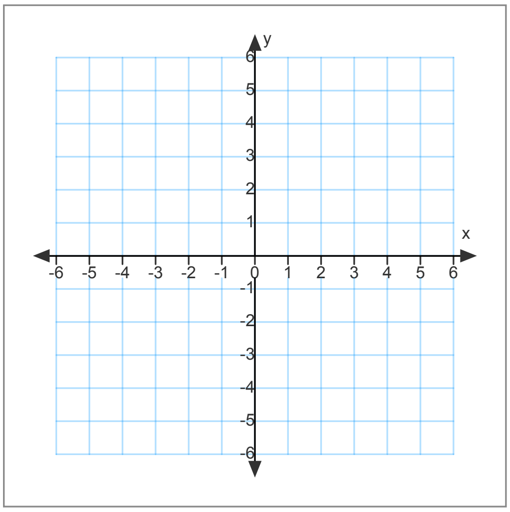
Why do you think this is called the Identity Function?

<u>Quadratic Functions</u> - A vertical parabola that opens either upward or downward.

Basic Equation - $y = ax^2 + bx + c$

Example: Sketch the graphs of $y = x^2$ and $y = -x^2$ on the grid below.

$y = x^2$



State:

a. Vertex

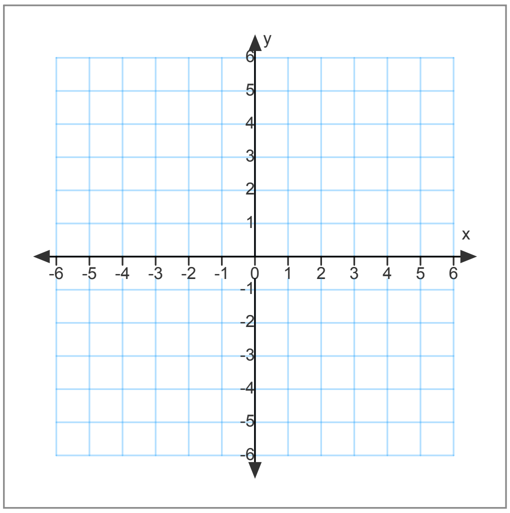
b. Equation of axis of symmetry

c. Direction of opening

d. Domain:

Range:

$y = -x^2$



State:

a. Vertex

b. Equation of axis of symmetry

c. Direction of opening

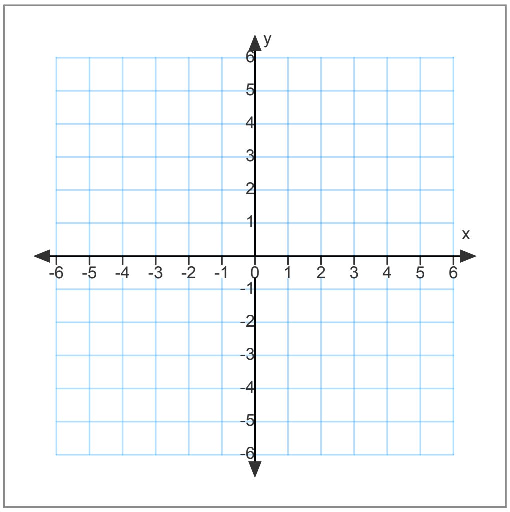
d. Domain:

Range:

<u>Reciprocal Functions</u> - The graph is a hyperbola whose asymptotes are the coordinate axis. asymptotes - lines that the graph approaches but does not intersect

Basic Equation - $y = \frac{1}{x}$, where x cannot equal zero.

Example: Sketch the graph of $y = \frac{1}{x}$ on the grid below.



Domain:

Range:

Example:

An investment required to earn $100.00 in one year at an annual interest rate of r , can be calculated by the function $P = \frac{100}{r}$

Graph the function on your calculator

a. Calculate the amount required to earn $100.00 interest at 2%, 4%, and 6%.
Recall: 'r' is calculated as a decimal in the formula I=Prt.

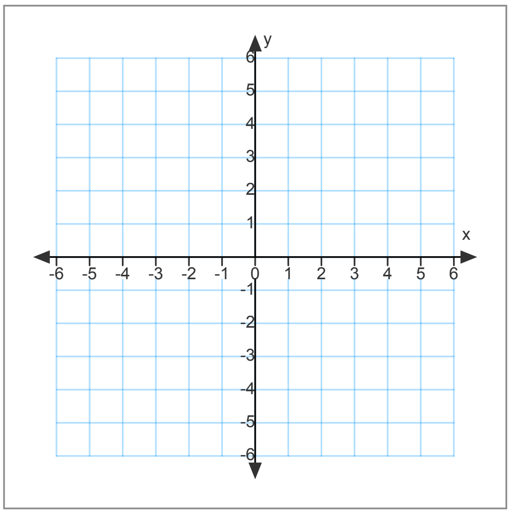
b. Suppose the interest rate is doubled. What happens to the investment required to earn $100.00 interest?

Radical Functions - This is the form of a power function as x is raised to some constant power.

This graph is an arc that will start at (0, 0) and extend in only one direction.

Basic Equation - $f(x)=\sqrt{x},\quad x\geq 0$, where x cannot be a negative number because we cannot take the root of a negative number. Also, the radical symbol for the function denotes the positive square root so y will also have a minimum value of zero.

Example: Sketch the graph of $f(x)=\sqrt{x}$ on the grid below.
$x\geq 0$



Domain:

Range:

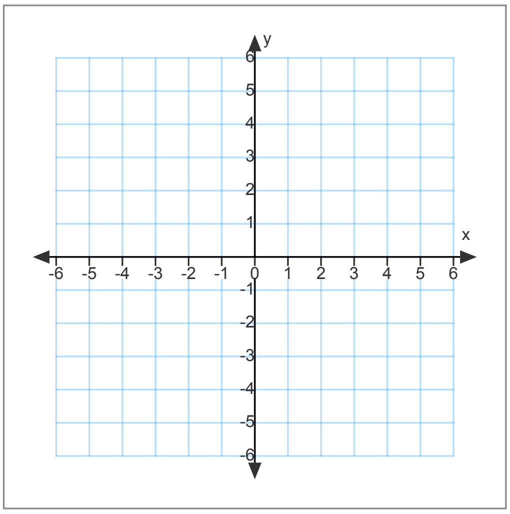
Absolute Value Functions

This graph is a V shape, with the cusp or point of the V occurring where the portion inside the absolute value symbol is equal to zero.

Basic Equation - $y=|x|$

Recall: absolute value means the distance from zero so only take the 'positive' value of what is inside the absolute value brackets.

Example: Sketch the graph of $y=|x|$ on the grid below.



Domain:

Range:

What happens to the graph if we change the equation to $y=|x-3|$?

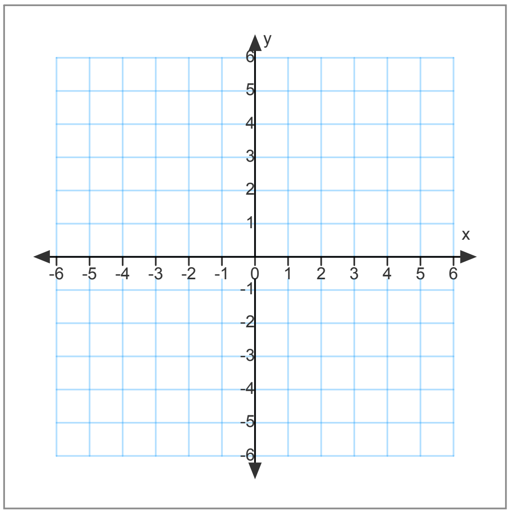
Calculator: To graph on the TI, use MATH > NUM >1

Polynomial Functions

A polynomial function fits the form $y = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x^1 + a_0 x^0$
where the exponents are Natural numbers.
The linear and quadratic functions are examples of polynomial functions, as are cubic, quartic and quintic functions.

Example: Sketch the graph of $y = x^3 - 3x^2$ on the grid below. Note that the graph will bend at most two times, and have at most, three x-intercepts.

In general: $y = a_n x^n$ has at most '(n-1)' bends, and crosses the x-axis at most, 'n' times.



Domain:

Range:

Polynomial functions have NO variable in the denominator and NO fractional exponents
(no radical over the variables)

Aug 15-12:02 PM

Homework

Complete Handout Assignment Part A: 'Graphing Functions'

Review Assignment - U1.L1.docx

Aug 15-6:32 PM

Part II. Function Notation.

$y = x^2$ is a quadratic function. Another way we can express this is using function notation.

$f(x) = x^2$ is the same function as $y = x^2$

Given that $f(x) = x^2 + 3$, find $f(2)$, $f(-1)$, $f(3x)$, $f(a)$, $f(a-1)$

Given that $f(x) = 2x + 1$,

find $f(-x)$ $f(2x)$

$f(x-1)$ $3f(x)$

$f(x)+3$ $2f(2x-1)+4$

Given that $g(x) = 3x^2 - 5x + 2$, find in simplest form:

$g(-x)$

$g(2x)$

$g(x-1)$

$3g(x)$

$g(x)+3$

$2g(2x-1)+4$

Given that $g(x)=\frac{1}{x}$, write the following in terms of the function, f .

$-\frac{1}{x}$

$\frac{1}{2x}$

$\frac{1}{x-1}$

$\frac{2}{x}$

$\frac{1}{x}+2$

$\frac{3}{2x}-4$

Aug 14-11:36 PM

Complete Handout Assignment Part B: 'Function Notation'

images from
http://mathforteaching.com (Beautiful Dance Moves)
http://christiancollegeminute.com (roller coaster)

Aug 15-6:32 PM

Attachments

Review Assignment - U1.L1.docx