

Math 150, Section 2.2

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Definition of the graph of a function

Definition

If f is a function with domain A , then the **graph** of f is the set of ordered pairs

$$\{(x, f(x)) \mid x \in A\}$$

In other words, the graph of f is the set of all points (x, y) such that $y = f(x)$; that is, the graph of f is the graph of the equation $y = f(x)$.

Graphing functions helps us understand the "behavior" of the function. A function of the form $f(x) = mx + b$ is called a **linear function** since its graph will be a line.

Making table and graphing functions from formula

Given a function you should be able to make a table, then plot those points and then graph the function. Try problems 2.2.8, 2.2.11, 2.2.14.

Graphing using calculator

Learn how to graph a function using your calculator including how to set up the window.

Try problems 2.2.28, 2.2.33, 2.2.34.

Finding domain and range from graph

Given the graph of a function, it is possible to find its domain and range by observing the graph. The domain will be all the points x on the x -axis such that the vertical line through x intersects the graph. The range will be all the points y on the y -axis such that the horizontal line through y intersects the graph.

Try problems 2.2.23, 2.2.24.

Graphing piecewise defined functions

Graphing piecewise defined functions are similar to graphing functions which are given by a single formula. Except that you have to be careful as to which formula to graph on which part. Try problems 2.2.43, 2.2.45, 2.2.49.

Vertical line test

Every function corresponds to a graph (you can graph every function) but not every graph corresponds to a function. The test that is used to tell whether a given graph is that of a function or not is called the Vertical line test.

Theorem

A curve in the coordinate plane is the graph of a function if and only if no vertical line intersects the curve more than once.

Try problems 2.2.55, 2.260.

Equations which define functions

Every function $y = f(x)$ can be written as an equation $y - f(x) = 0$ but not all equations in x and y can be rewritten as $y = f(x)$. For example the equation $x^2 + y^2 = 1$ does not solve for y "uniquely" and thus does not represent a function. If we want to find out whether a given equation in x and y defines a function or not we can try to solve the equation for y and if we are able to solve for y uniquely then the equation represents a function, otherwise it doesn't.

Try problems 2.2.61, 2.2.63, 2.2.68, 2.2.71.