



Math122 College Algebra

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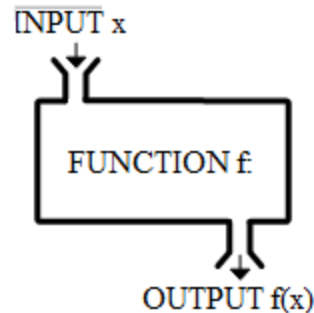
3.1

What is a Function?

- A function f is a rule that assigns to each element x in a set A exactly one element, called $f(x)$ in a set B .
- $f(x)$ is read ***f of x*** or ***f at x***
- The set A is the domain and the set B is called the range

Machine Diagram of a Function

http://en.wikipedia.org/wiki/File:Function_machine2.svg



- The variable x is a number in the domain and is called the independent variable
- The symbol f represents a number in the range and is the dependent variable

Function Examples

- f is the rule “square the number” which mathematically is $f(x) = x^2$
 - $f(2)$ means apply the rule f to the number 2, so $f(2) = 2^2 = 4$
- f is the rule “the area of a circle is a function of its radius” which is $f(r) = \pi r^2$

Function Example

Consider the function $f(x) = x^2 + 1$

1. Express in words how f acts on input x to produce output $f(x)$
2. What is $f(3)$, $f(-1)$, $f\left(\frac{1}{2}\right)$, and $f(\sqrt{2})$?

Function Example

Consider the function $f(x) = x^2 + 1$

3. What is the domain of f ? Why?

4. What is the range of f ? Why?

Problem

Consider the function $f(x) = \frac{x-2}{2}$

1. Express in words how f acts on input x to produce output $f(x)$
2. What is $f(2)$, and $f\left(\frac{1}{2}\right)$

Problem

Consider the function $f(x) = \frac{x-2}{2}$

3. What is the domain of f ? Why?

4. What is the range of f ? Why?

Piecewise Defined Functions

- A cell phone plan costs \$59.95 a month. The plan includes 500 free minutes and charges 10 cents for each additional minute of usage.
- The monthly charges are a function of the number of minutes used.
- $C(m) = \left\{ \right.$

Domain of a Function

- The domain of a function can be
 - a) explicitly stated
 - b) implied by the algebraic expression of the function
- Can you give an example of a) and b) above

Problems

- Find the domain for each of the following functions.

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

$$b) g(t) = \sqrt{9 - t^2}$$

$$c) h(k) = \frac{1}{\sqrt{k+1}}$$

Ways to represent a function

- There are four ways to represent a function
 1. verbally (describe in words)
 2. algebraically (an explicit formula)
 3. visually (using a graph)
 4. numerically (by a table of values)
- Problem: Using each of the previous methods, show how to convert a Celsius temperature to Fahrenheit