

Precalculus Learning Goals - Week 2

This week we'll start a section on **Functions – Properties and Examples**. The general goals for this section are as follows. At the end of this section, students should be able to:

- *Be comfortable with the language, notation, and pictures of functions, as well as be able to translate between them.*
- *Know several examples of functions and their basic properties, both mathematical and “real-world.”*
- *Be able to generate new functions from old through the standard function operations.*

More specifically, at the end of this week you should be able to:

- Define *function, domain, range, independent variable, dependent variable*.
- Read and write function notation, including piecewise function notation.
- Discuss the difference between a relation and a function.
- Identify whether a relation is a function or not based on a formula, graph, table, written description, or other presentation.
- Evaluate a function at a given input based on a formula, graph, table, written description, or other presentation.
- Given formula, graph, table, written description, or other presentation of a function, write the function in another form.
- Compute the (implied) domain and range of a function based on a formula, graph, table, written description, or other presentation (only requiring simple algebraic techniques).

Sample Problems. Here are some sample problems, of the type that you would do to demonstrate that you've learned the material. These are not the only types of problems you may see – they're just a sample.

- Let $f(x) = \begin{cases} x^3 & \text{if } x > 4 \\ -x + 5 & \text{if } x < 4 \end{cases}$. What is $f(3)$? $f(0)$? Sketch a graph of f .

What is the domain of f ? What is the range of f ?

- What is the difference between a relation and a function?
- Say f is given by the following graph (graph omitted). Fill in the missing

entries in the table below.

| | | | | |
|--------|----|----|---|---|
| x | -3 | -1 | 0 | |
| $f(x)$ | | | 2 | 5 |

- Give an example of a function whose domain is the set $(-\infty, \infty)$ and whose range is the set $\{1, 2\}$.
- Given the following relation, is it possible to write y as a function of x ?
 $xy + y = x - 3$
- Give an example of a linear/quadratic/exponential/etcetera function f , and compute $f(-2)$.
- Here's a new function f . Is it true that $f(a + b) = f(a) + f(b)$?
- Compute the domain of $f(x) = \frac{\sqrt{3}}{(x-2)^2}$.