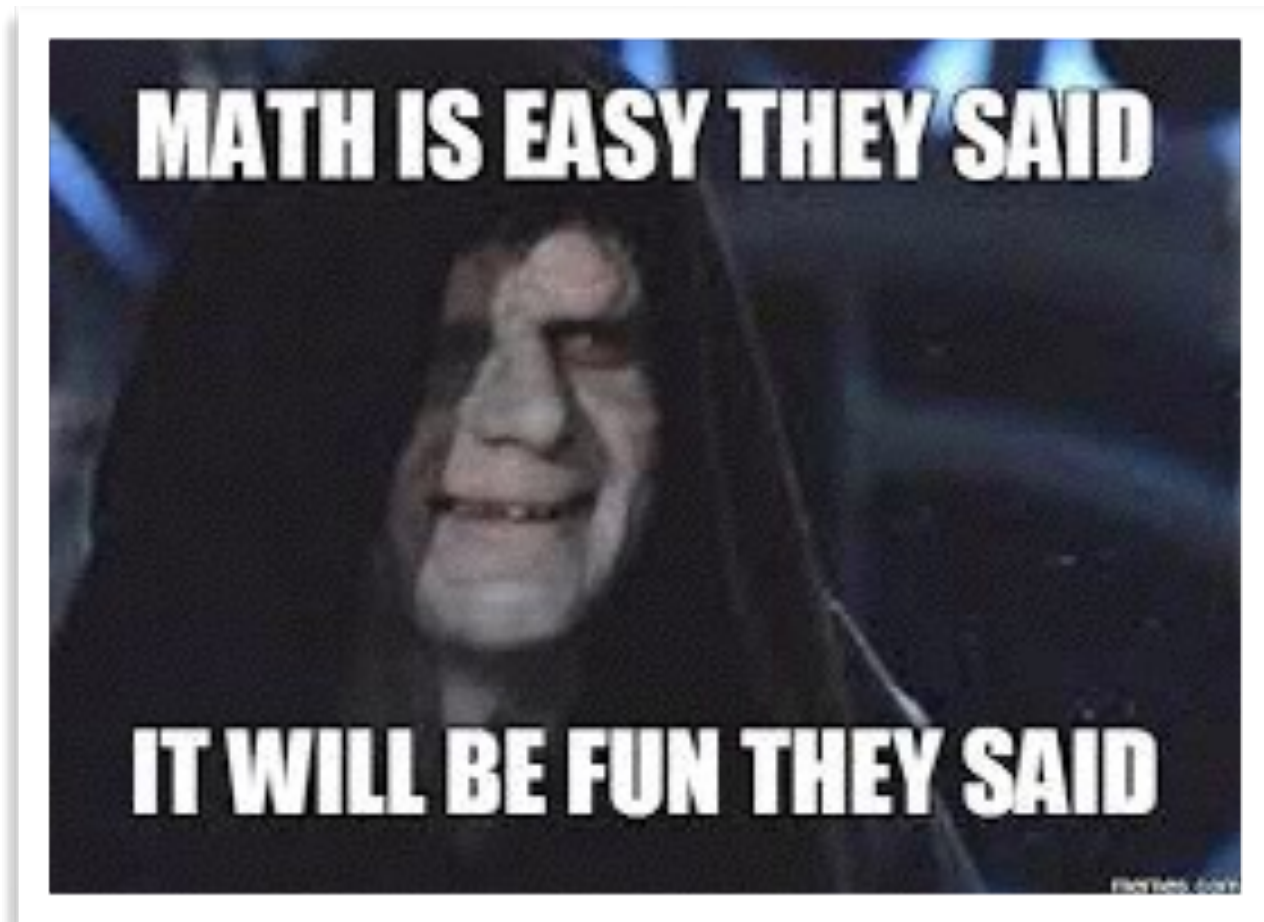


Title of Lesson: Introduction to Functions
Section 1.2



By the end of this lesson, I will be able to answer the following questions...

1. How do I decide if a **relation** is a function?
2. What is **function notation**?
3. How do I find the **domain** of a function algebraically?
4. What are ***difference quotients*** and why are they useful?
5. How do I build function based on a scenario and use technology with the function to make predictions?

Vocabulary

1. **Function:** Every input has one unique output.
2. **Domain:** The set of inputs for which the function is defined.
3. **Range:** The set of possible outputs for a given function
4. **Piece-Wise Function:** A function that is defined by two or more equations over a specific domain.
5. **Difference Quotient:**

$$\frac{f(x+h) - f(x)}{h}, h \neq 0$$

Prerequisite Skills with Practice

Evaluate the following function for $f(3)$, $f(0)$ and $f(-3)$.

$$f(x) = -x^2 + 3x - 3$$

Isolate “y” in the follow equation.

$$(x - 2)^2 + (y + 3)^2 = 25$$

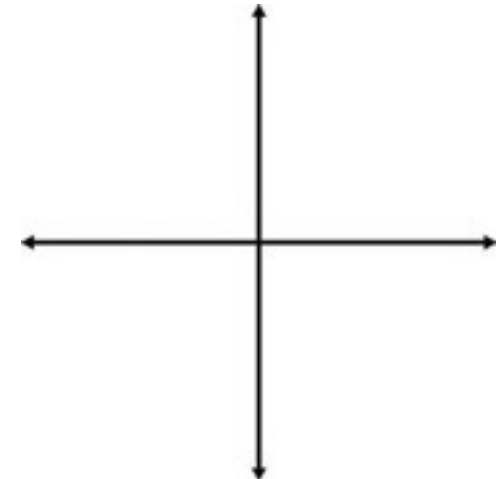
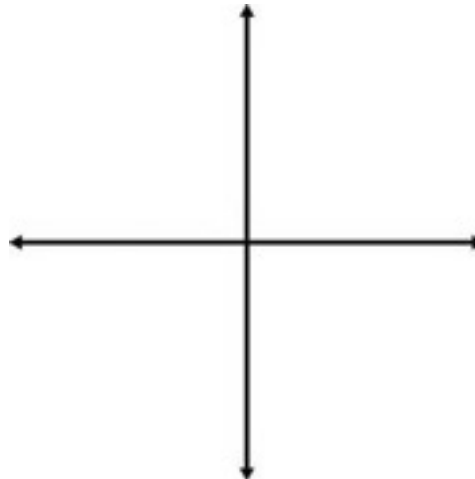
When is a relation a function?

Vertical Line Test.

Why does it work?

Input	Output

Input	Output



Testing for functions algebraically.

Looking for a \pm sign OR envision the graph...

Piecewise-Defined Function Evaluating.

Evaluate $f(-2)$, $f(0)$, $f(3)$

$$x^2 + y = 1$$

$$x + y^2 = 1$$

$$y = -3$$

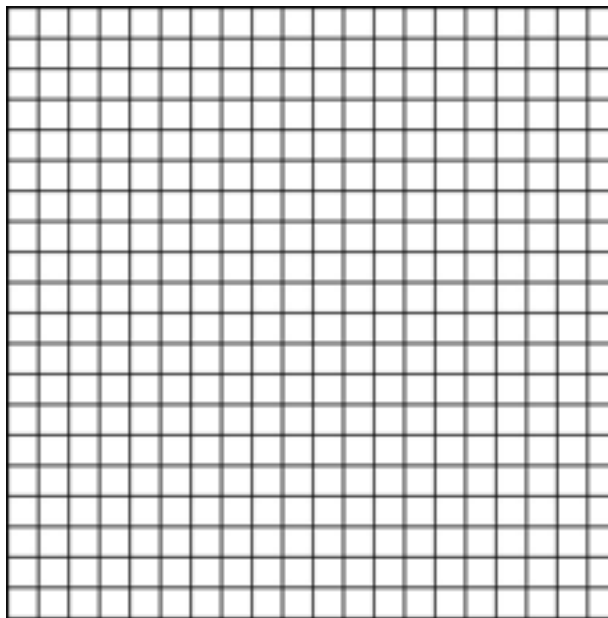
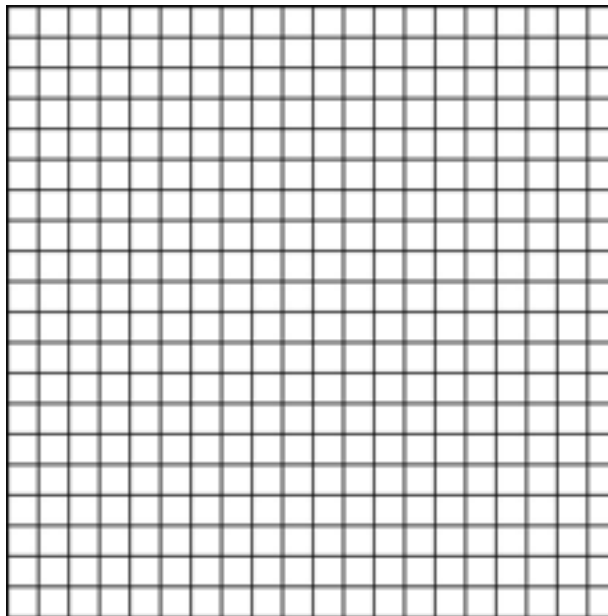
$$x = \frac{4}{3}$$

$$\text{Given } f(x) = \begin{cases} 5 - 2x^2, & x < 0 \\ 2x + 5, & x \geq 0 \end{cases}$$

**Piecewise-Defined Function
Sketching.**

$$f(x) = \begin{cases} -2x + 1, & x < 2 \\ x + 3, & x \geq 2 \end{cases}$$

$$g(x) = \begin{cases} x + 1, & x < -3 \\ 2, & -3 \leq x \leq 0 \\ -x + 3, & x \geq 0 \end{cases}$$



Determining domains of functions.

Need to consider the values for which the function is defined and the real world implications of the function.

$$f : \{(-3,0),(-1,5),(0,7),(3,5),(6,7)\}$$

$$g(x) = -3x^2 + 4x + 5 \qquad h(x) = \frac{1}{x+5}$$

The volume of a sphere: $V(r) = \frac{4}{3}\pi r^3$

$$k(x) = \sqrt{4 - 3x} \qquad l(x) = \frac{1}{x^2 - 3x + 2}$$

$$m(x) = \sqrt{x^2 + 2x - 8}$$

The Box Problem.

1. Sketch
2. Write everything you know about the problem
3. Combine to make a function in one variable.
4. Use function with technology to answer question

Calculator Skills:

Basic Input

Adjusting Window

Finding Maximums

A sheet of metal 12 inches by 10 inches is to be used to make a open box. Squares of equal sides x are cut out of each corner then the sides are folded to make the box. Find the value of x that makes the volume maximum.

Difference Quotients

$$\frac{f(x+h) - f(x)}{h}, h \neq 0$$

Understanding the difference quotient graphically and algebraically

Find the **Difference Quotient** for the functions below and simplify your answer.

THE END



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