Functions Video Lecture

Sections 2.1 and 2.2

Course Learning Objectives:
Demonstrate an understanding of the concept of function, and functional attributes such as domain and range. Determine these attributes for a function given its graph and/or its rule.

Weekly Learning Objectives:

1) Determine whether a relation represents a function.
2) Find the domain, range, argument and image of a function.
3) Use the vertical line test.
4) Find the value of a function and simplify function notation.
5) Find a simplified difference quotient for a function.
6) Find the domain of a function defined by an equation.

Functions

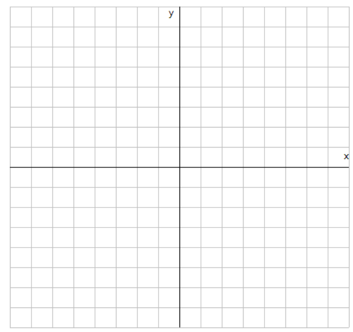
A relation is any set of ordered pairs.
It is a correspondence that maps x values to y values.

Different ways of representing a relation:

List {(-1,3), (2,4), (6,1), (6,2)}

Correspondence or Mapping

Graph



Domain: the set of all inputs

Argument: a specific input value (x-value)

Range: the set of all outputs

Image: a specific output value (y-value)

Find the image of the argument 2:

Find the argument of the image 2:

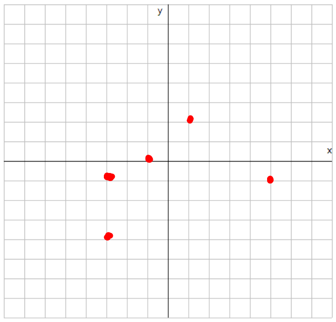
1 is the image of:

Definition of a function: a relation that sends every input to exactly one output

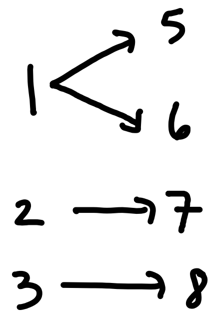
Example that is not a function
Spam e-mail

Example that is a function
Regular Mail

Determine whether each of the following is a function or not and find the domain and range of each.



{(-1,2),(5,4),(6,4)}



Function:

Domain:

Range:

Function:

Domain:

Range:

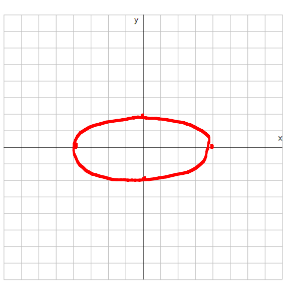
Function:

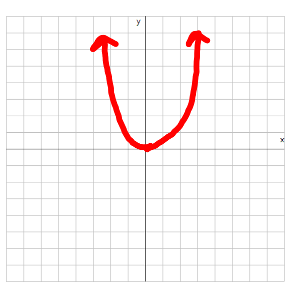
Domain:

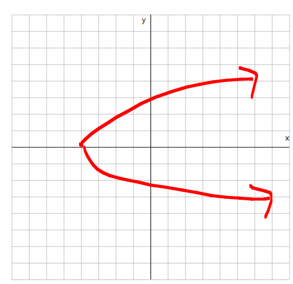
Range:

Vertical Line Test: A graph will be a function if no vertical line intersects the graph in more than one point.

Determine whether each of the following is a function or not and find the domain and range of each.







Function:

Domain:

Range:

Function:

Domain:

Range:

Function:

Domain:

Range:

Function notation: $f(x) = x^2$ $g(x) = 2x-3$

$f(\square) = \square^2$ $g(\square) = 2\square - 3$

$f(4) =$

$g(6) =$

$f(a) =$

$f(a + b) =$

$g(a + b) =$

$f(a + b) - f(a) =$

$f(x) = x^2 - 2x + 1$ $g(x) = \sqrt{x-1}$

$p(x) = \{(-1,2),(3, -6), (4,1), (1,4)\}$

Find:

$f(x+h)-f(x) =$ **$2f(x+1) =$**

$p(4) =$ **$g(0) =$**

$g(x+2) =$

Let $f(x) = 3x^2 - x + 1$

$g(x) = 5x - 3$

Find:

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

$g(a) + g(b) =$

$g(x-3) + 2 =$

$2 - g(xy) =$

$(f(x))_2 - 2(x+3) =$

$f\left(\frac{x}{2}\right) =$

$\frac{f(x)}{2} =$

Difference Quotients:

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

Find the simplified difference quotient of f(x): $f(x) = 2x^2 - 3x + 1$

Finding Domains of a Function:
Remember that the domain of a function is the set of all x's that make f(x) defined.
Some typical domain issues that might result in a restricted domain include:

1) **dividing by zero**
2) **taking an even root of a negative number**

Find the domain of the following functions:

$f(x) = x^2 + 5x$

$f(x) = \dfrac{x-3}{x^2-4}$

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

$f(x) = \dfrac{x+2}{x^3-4x^2-9x+36}$