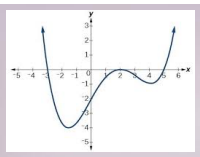
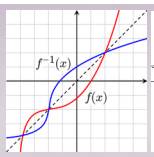
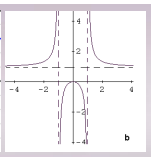
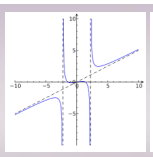
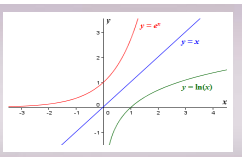



$$-3x+4y=5$$
$$2x-y=-10$$
$$\begin{bmatrix}-3 & 4\\ 2 & -1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}5\\ -10\end{bmatrix}$$

$$\sum_{k=1}^{m} k = \frac{m(m+1)}{2}$$
$$\sum_{k=0}^{n} z^k = \frac{1-z^{n+1}}{1-z}$$

Math 1050 ~ College Algebra

1 Introduction to Functions

Learning Objectives

- Determine whether a relation represents a function.
- Use the vertical line test to identify graphs of functions.
- Find the domain and range from the graph of a function.
- Find input and output values of a function.
- Find the domain from the equation of a function.

A **relation** is a set of ordered pairs. The set of first components of the ordered pairs is called the **domain** and the set of second components of the ordered pairs is called the **range**.

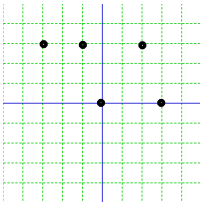
input value	output value
independent variable	dependent variable

Ex1: For each of these, state whether it is a relation, and if it is, list the elements in the domain and in the range.

a) {(1,5), (5,-2), (5,4), (3,2)}

b)

Bud	15
May	16
Ezi	17
Zhu	18
Tia	19

c) 

d) Input values: days of the week
Output values: final letter in word

e) {name, rank, serial number}

A **function** is a relation in which any two ordered pairs with the same first component also have the same second component.

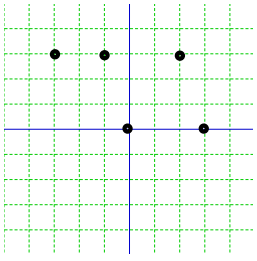
Ex 2: From example 1, which of the relations are functions?

a) {(1,5), (5,-2), (5,4), (3,2)}

b)

Bud	15
May	16
Ezi	17
Zhu	18
Tia	19

c)



d) Input values: days of the week
Output values: final letter in word

An equation in two variables can be a relation as can a 2-dimensional graph.

Ex 3: Which of these are functions?

a) $x+3 = y^2$

b) $2y = \sqrt{x-1}$

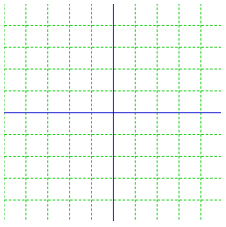
c) $x^2 + y^2 = 9$

d) {(3,1), (2,1), (5,1), (6,2)}

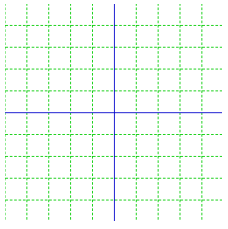
The Vertical Line Test: A graph represents a function if no vertical line intersects it at more than one point.

Ex 4: Use the vertical line test to determine if these relations are functions.

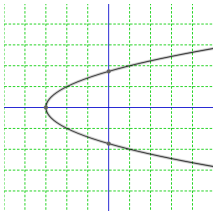
$R_1 = \{(1,5), (5,-2), (5,4), (3,2)\}$



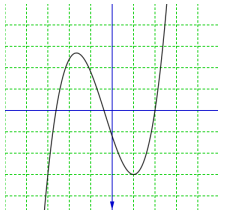
$R_2 = \{(3,1), (2,1), (5,1), (-3,2)\}$



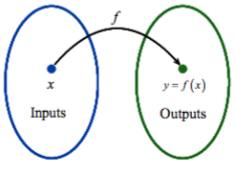
R_3



R_4



Function Notation



Ex 5: Evaluate these functions for the given values.

a) $f(x) = \sqrt{x+8} + 2$

$f(-8)$

$f(x-8)$

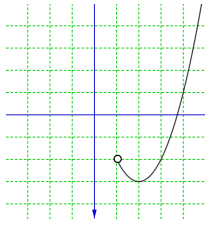
$f(a)$

b) $g(2)=$

$g(0)=$

$g(a) = -2$ for $a =$

$g(x)$



Domain of Functions

The domain of a function is the set of all input values for which the function is defined.

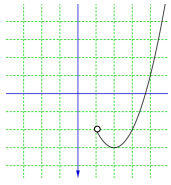
Implicit domain

Explicit domain

Ex 6: Determine the domain for each of these functions and identify as implicit or explicit.

a) $f(x)=\sqrt[3]{x+4}$

b) $p(x)$



c) $g(x)=\dfrac{3}{x^2-2x}$

d) $f(x)=\dfrac{\sqrt{x+4}}{4+x}$

e) $h(x)=5x-3, \quad x>-1$