# Identifying functions and using function notation

1/5/18

- A relation is a pairing of input and output values
- The domain contains the input values.
- The range of a function or relation contains the output values.
- The input value, normally *x*, is the independent variable.
- The output, normally *y*, is called the dependent variable

**The input of a function is the independent variable. The output of a function is the dependent variable. The value of the dependent variable *depends* on, or is a function of, the value of the independent variable.**

# Caution!!!!!

- In a function, the *y* values may repeat, the *x* values may not.

# Function

- A **function** is a mapping between 2 sets that associates with each element of the first set, the domain, a unique (one and only one) element of the second set, the range.

# Identifying functions

| Input | Output |
| --- | --- |
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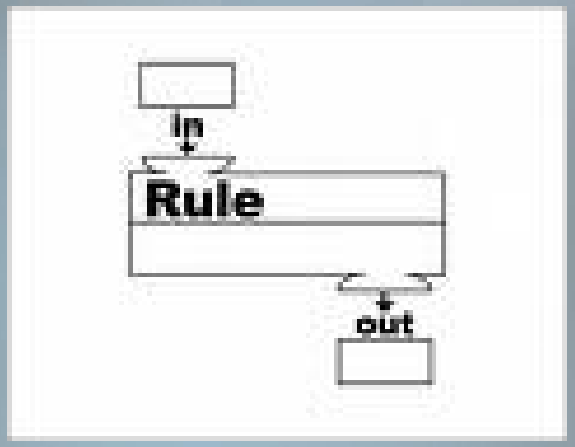
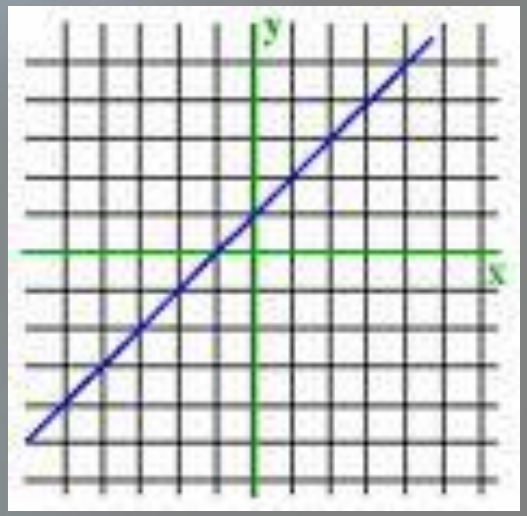
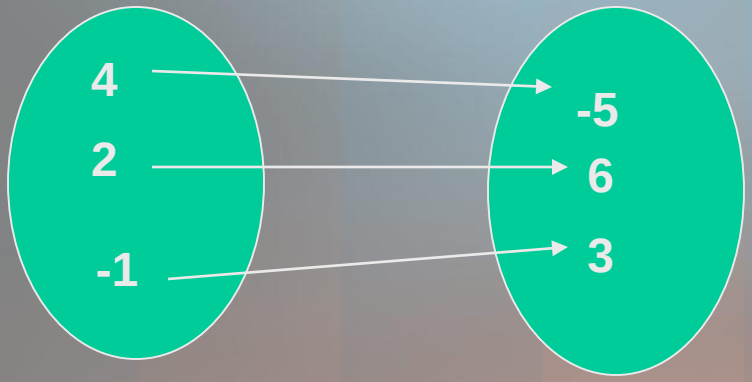
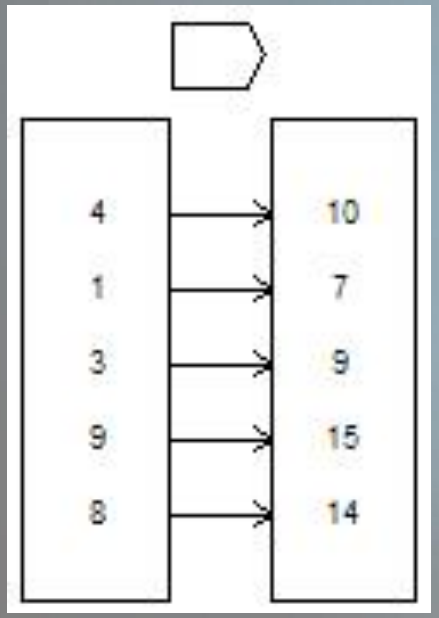
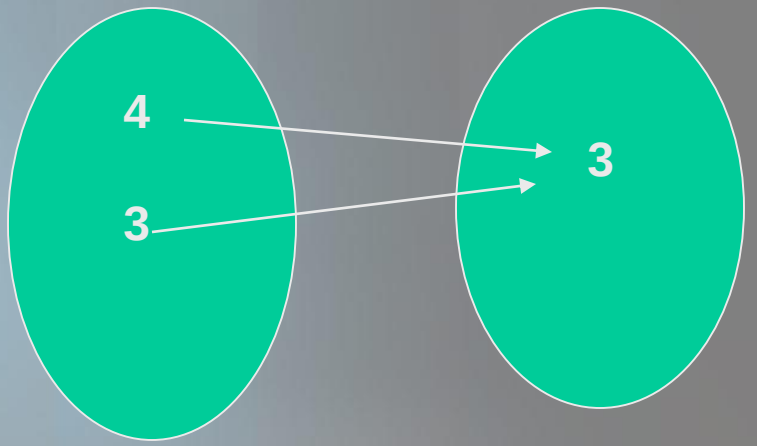


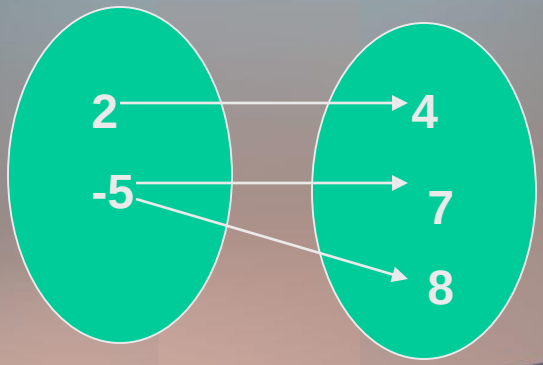



# Identifying functions, domain and range

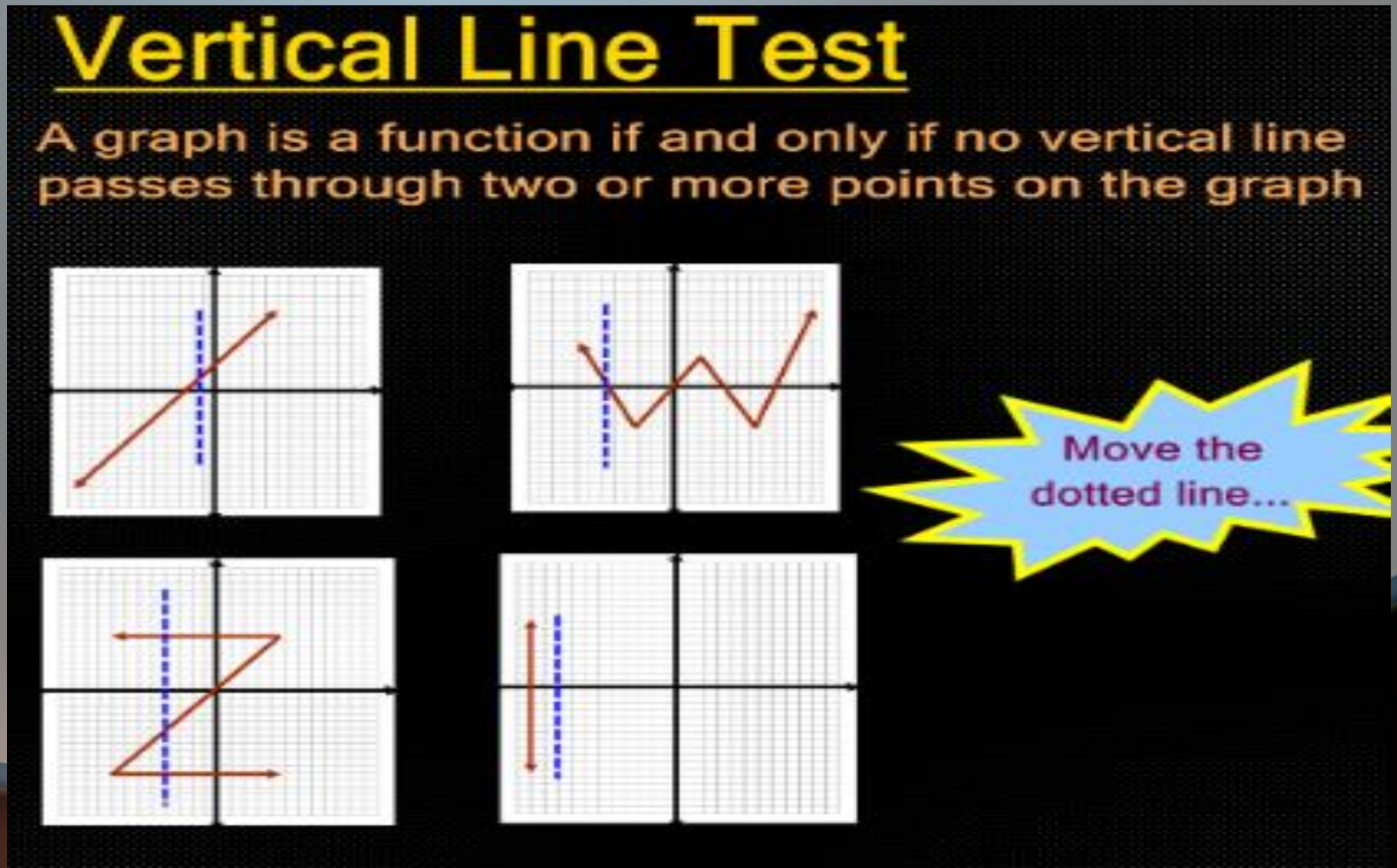


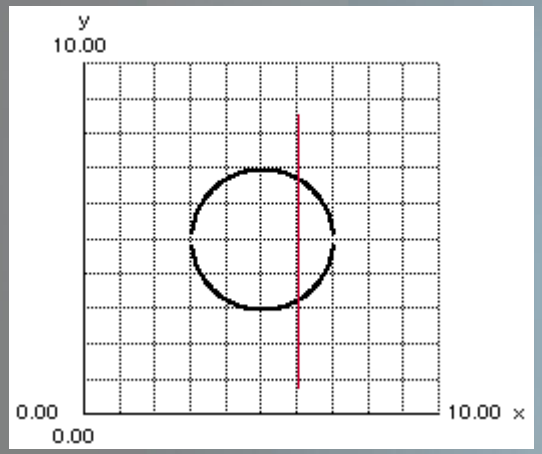



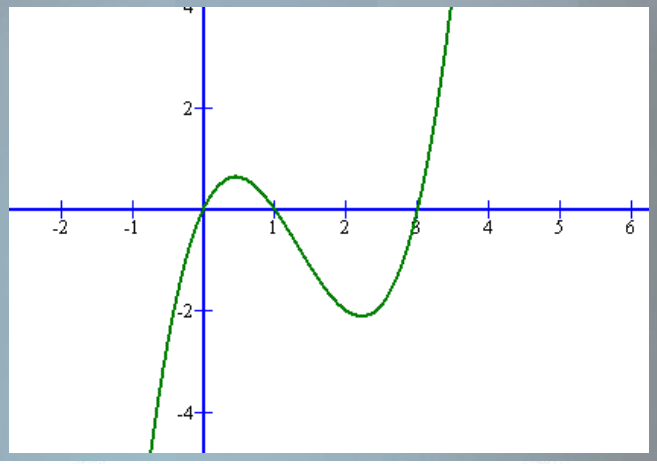
# Vertical line test

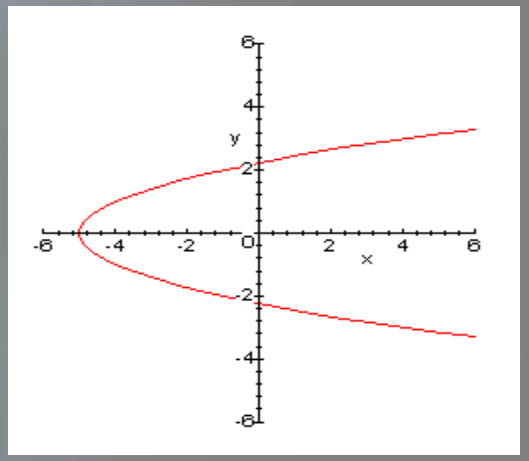
- When a relation is represented by a graph, the vertical line test is used to determine if the relation is a function

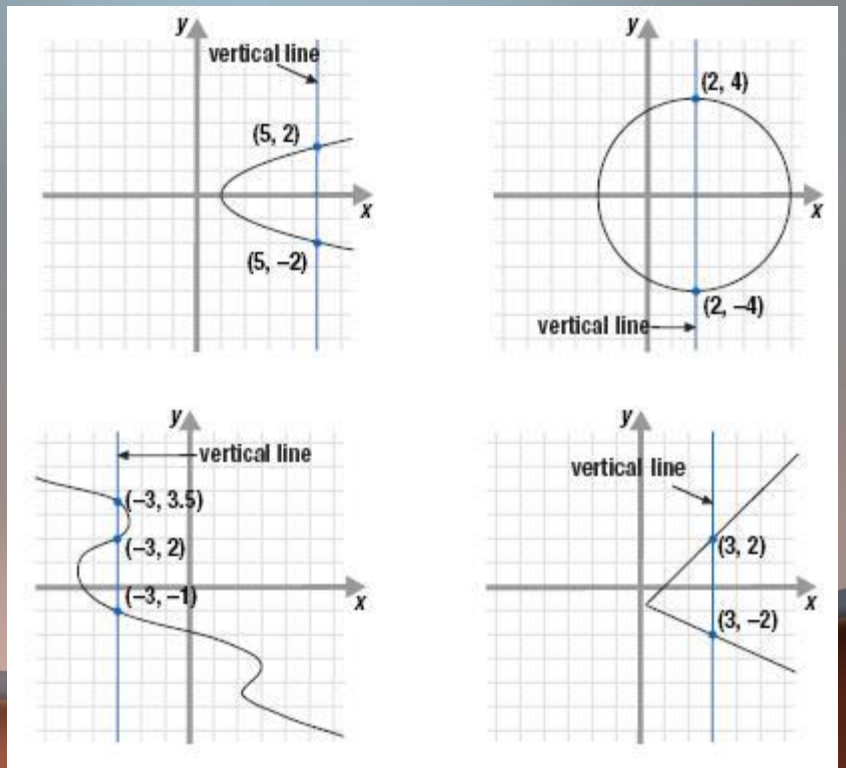


# Are these functions?



# Example 1: Identifying Independent and Dependent Variables

**Identify the independent and dependent variables in the situation.**

**A painter must measure a room before deciding how much paint to buy.**

**The amount of paint *depends on* the measurement of a room.**

**Dependent: amount of paint**
**Independent: measurement of the room**

# Example 2: Identifying Independent and Dependent Variables

**Identify the independent and dependent variables in the situation.**

**The height of a candle decrease *d* centimeters for every hour it burns.**

**The height of a candle *depends* on the number of hours it burns.**

**Dependent: height of candle**
**Independent: time**

# Example 3: Identifying Independent and Dependent Variables

**Identify the independent and dependent variables in the situation.**

**A veterinarian must weigh an animal before determining the amount of medication.**

**The amount of medication *depends on* the weight of an animal.**

**Dependent: amount of medication**
**Independent: weight of animal**

- It is sometimes necessary to work with more than one equation at a time.
- **Function notation** uses parentheses and letters to distinguish between equations
- The equation y= x + 2 can be written
- f(x) = x+2
- The equation y = x-5 can be written
- g(x) = x-5
- If I want to evaluate for x = 2, I would need to know which equation I wanted to use. Functional notation tells me that.
- g(2) means I want to replace x with 2 in the ***g*** function,
- So g(2) = 2-5 = -3
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# Using Function notation to evaluate functions

- If h (x) = 4x-3 and p (x) = $x^2$ -3x  find p(-3)

- Use the "p" function
- p(-3) = $(-3)^2$ -3(-3)
- = 9 +9
- = 18

# Evaluate functions

- If $h(x) = -5x^2 + 2$ and $p(x) = x/2 - 3x$ find $h(-2)$

# Word problem

- A company charges $.25 per minute for a cell phone call. This can be expressed as the ordered pair (1, .25). Find the cost of a 2 minute call, 3-minute, and 4-minute call. Express the answers in set notation. Identify the domain and range. Determine if the set represents a function.
- 1 minute = (1, .25)
- 2 minute = (2, .5)
- 3 minute = (3, .75)
- 4 minute = (4, 1)
- Domain = 1,2,3,4, Range = .25, .5, .75, 1
- Yes, function for every x value there is exactly one y value

# Problem

- The company charges $.25 per minute for up to 3 minutes and then $.10 for every minute thereafter.
- Find the cost of a 2 minute, 3 minute and 4 minute call. Express the answers as ordered pairs.
- Find the domain and range.
- Is the set a function?

# practice

- 1. If a (x) = 9 + 6x and v (x) = $9x + 3x^2$, find v(2)

- 2. If you buy one ticket to a local baseball game, the cost is $25. This can be expressed as the ordered pair (1,25). There is a 1-day special if you buy one ticket at regular price, each additional ticket is $20. Find the cost if you buy 2,3,and 4 tickets. Express the answers as ordered pairs in set notation. Identify the domain and range. Is the set a function?

| FORM A | FORM B |
| --- | --- |
| $\boldsymbol{y = 5x - 3}$ | $\boldsymbol{f(x) = 5x - 3}$ |
| Find $y$ when $x = 2$ | Find $f(2)$. |
| $y = 5x - 3$ | $f(x) = 5x - 3$ |
| $y = 5(2) - 3$ | $f(2) = 5(2) - 3$ |
| $y = 10 - 3$ | $f(2) = 10 - 3$ |
| $y = 7$ | $f(2) = 7$ |
| solution: $(x, y) = (2, 7)$ | solution: $(x, f(x)) = (2, 7)$ |