

Chapter 16

Functions

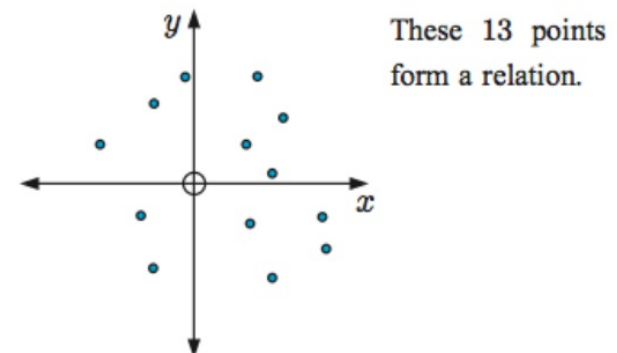
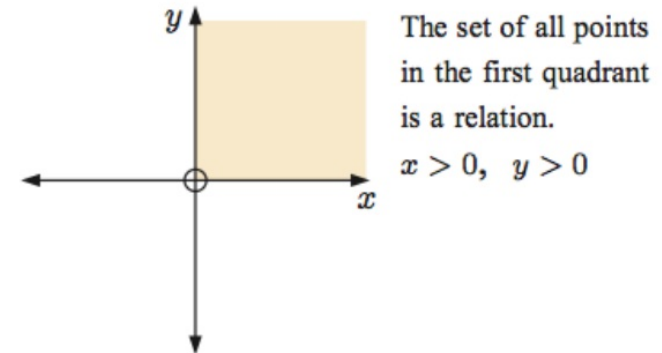
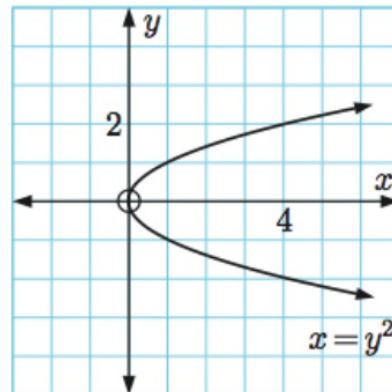
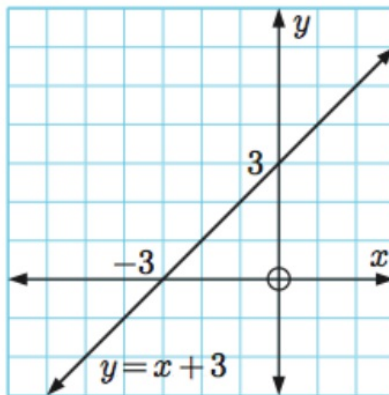
- A** Relations and functions
- B** Function notation
- C** Domain and range
- D** Linear models

Syllabus reference: 6.1, 6.2

RELATIONS

A **relation** is any set of points which connect two variables.

Examples of relations:



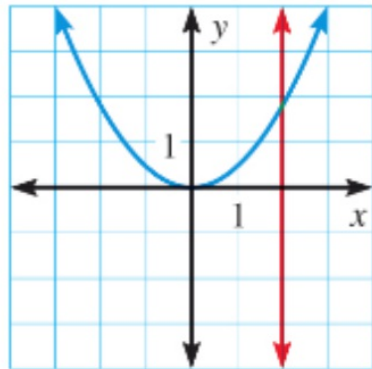
FUNCTIONS

A **function**, sometimes called a **mapping**, is a relation in which no two different ordered pairs have the same x -coordinate or first component.

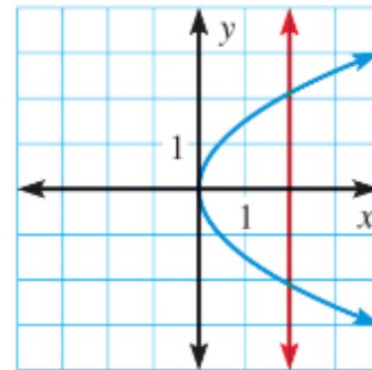
Vertical Line Test

A relation is a function if and only if no vertical line intersects the graph of the relation at more than one point.

Function

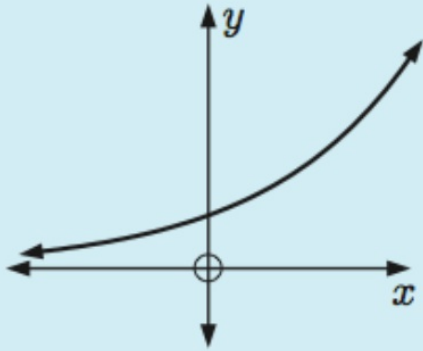


Not a function

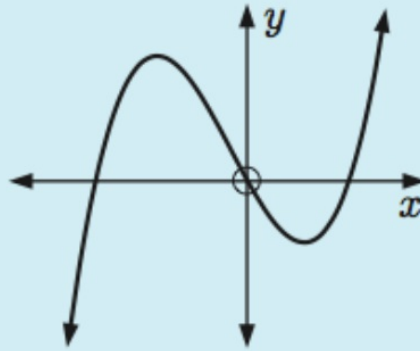


Which of the following relations are functions?

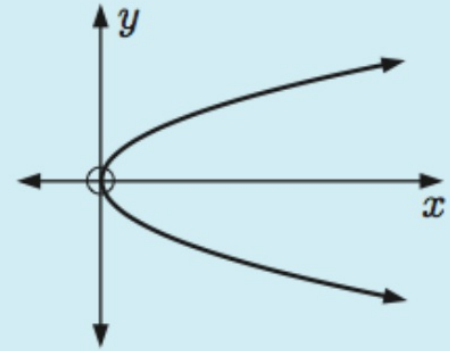
a






b



c



GRAPHICAL NOTE

- If a graph contains a small **open circle** such as , this point is **not included**.
- If a graph contains a small **filled-in circle** such as , this point is **included**.
- If a graph contains an **arrow head** at an end such as , then the graph continues indefinitely in that general direction, or the shape may repeat as it has done previously.

B**FUNCTION NOTATION**

$f(x)$ is the value of y for a given value of x , so $y = f(x)$.

If $f(x) = 2x^2 - 3x$, find the value of: **a** $f(5)$

$$\begin{aligned} f(5) &= 2(5)^2 - 3(5) \\ &= 2(25) - 15 \\ &= 50 - 15 \\ &= 35 \end{aligned}$$

$$f(5) = 35$$

If $f(x) = 5 - x - x^2$, find in simplest form: **a** $f(-x)$ **b** $f(x+2)$

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

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

(b)

$$f(x) = 5 - (x+2) - (x+2)^2$$
$$= 5 - x - 2 - x^2 - 4x - 4$$
$$= -x^2 - 5x - 1$$

C

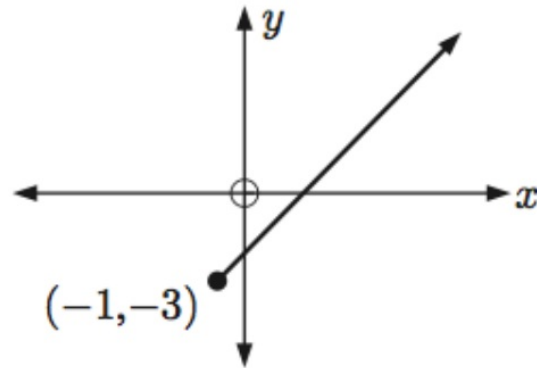
DOMAIN AND RANGE

The **domain** of a relation is the set of values of x in the relation.

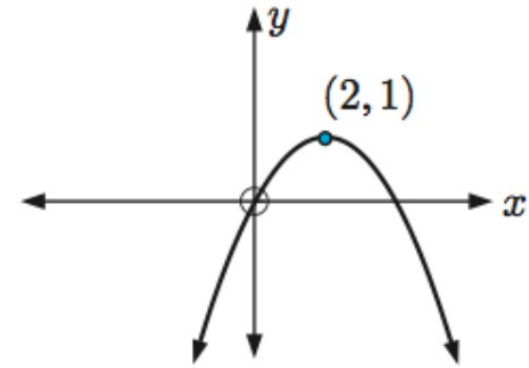
The **range** of a relation is the set of values of y in the relation.

For each of the following graphs state the domain and range:

(1)



(2)



① domain: $\{x \mid x \geq -1, x \in \mathbb{R}\}$

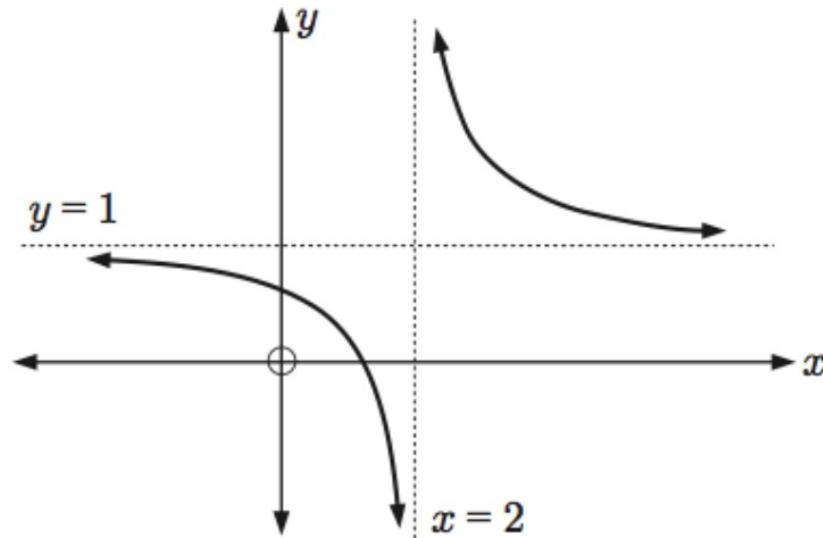
range: $\{y \mid y \geq -3, y \in \mathbb{R}\}$

② d: $\{x \in \mathbb{R}\}$

r: $\{y \mid y \leq 1, y \in \mathbb{R}\}$

For each of the following graphs state the domain and range:

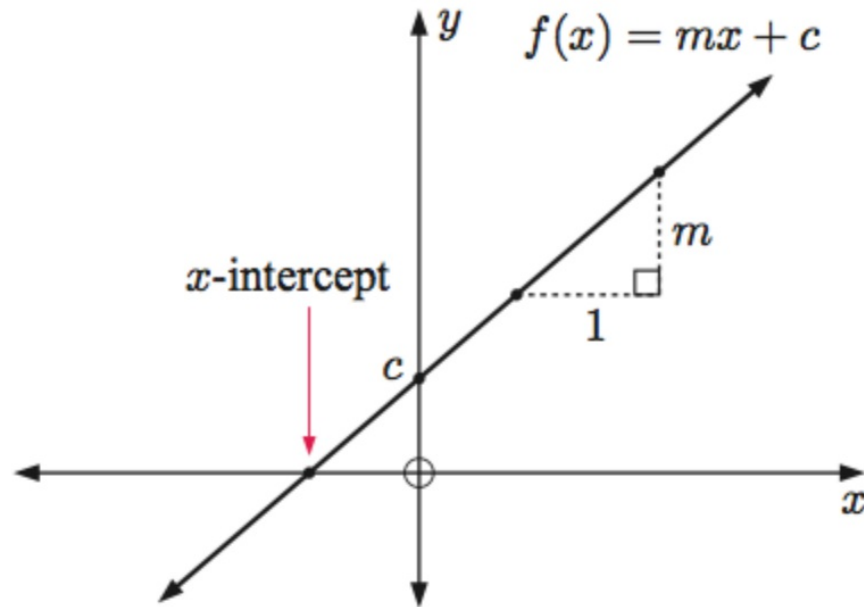
(3)



domain: $\{x \neq 2\}$
range: $\{y \neq 1\}$

A **linear function** is a function of the form $f(x) = mx + c$ where m and c are constants, $m \neq 0$.

GRAPHS OF LINEAR FUNCTIONS



The cost of hiring a tennis court for h hours is given by the formula $C(h) = 5h + 8$ dollars. Find the cost of hiring the tennis court for: **a** 4 hours **b** 10 hours.

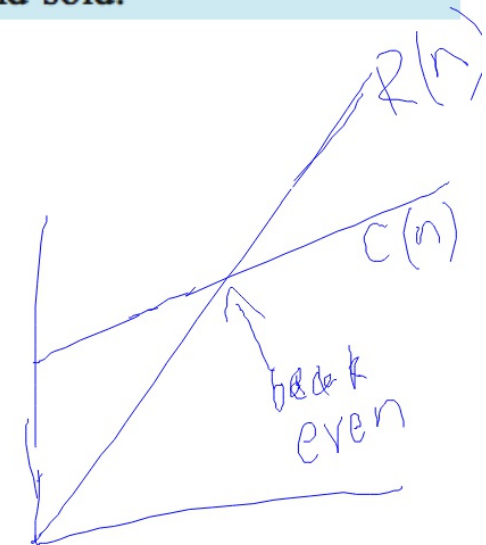
It costs an appliance manufacturer \$12 000 to set up the machinery to produce a new line of toaster. Following this initial setup cost, every 100 toasters produced will cost a further \$1000. The toasters are sold to a distributor for \$25 each.

- a Determine the cost of production function $C(n)$ where n is the number of toasters manufactured.
- b Determine the income or revenue function $R(n)$.
- c Graph $C(n)$ and $R(n)$ on the same set of axes for $0 \leq n \leq 1500$.
- d How many toasters need to be produced and sold in order to 'break even'?
- e Calculate the profit or loss made when:
 - i 400 toasters
 - ii 1500 toasters are produced and sold.

$$a) C(n) = 12000 + \frac{1000}{100} n$$

$$12000 + 10n$$

$$b) R(n) = 25n$$



Assignment:

Review Set 16 C