Section 1.2

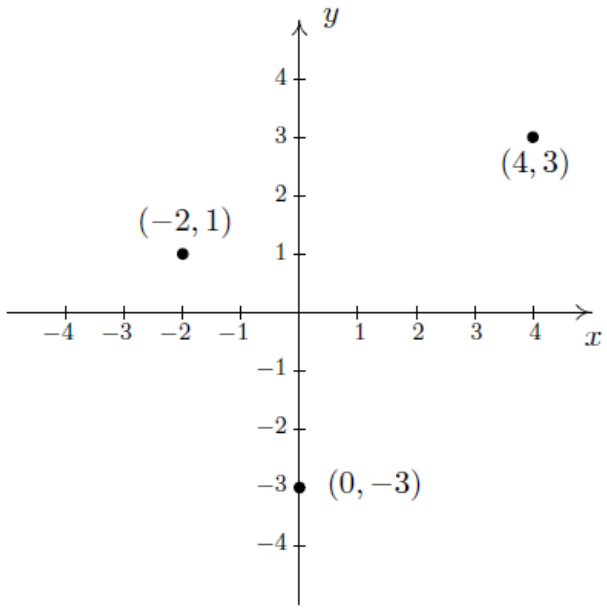
Relations

Relation

- A Relation is a set of points in the plane (graphical description)
- The Roster method lists all of the points which belong to the relation R
- We write:

R = { (-2,1),(4,3), (0,-3) }

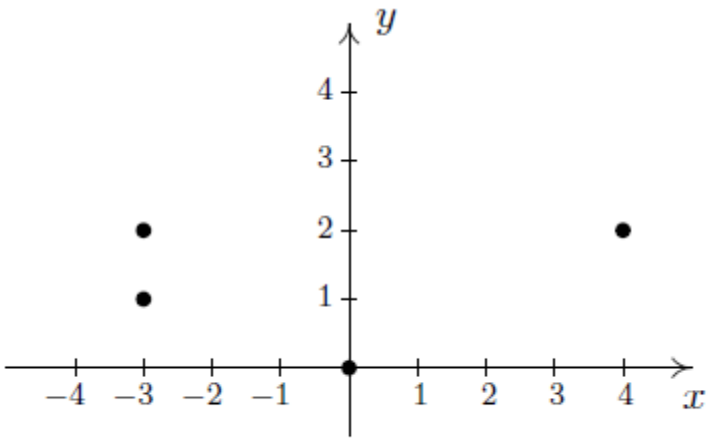
Roster description



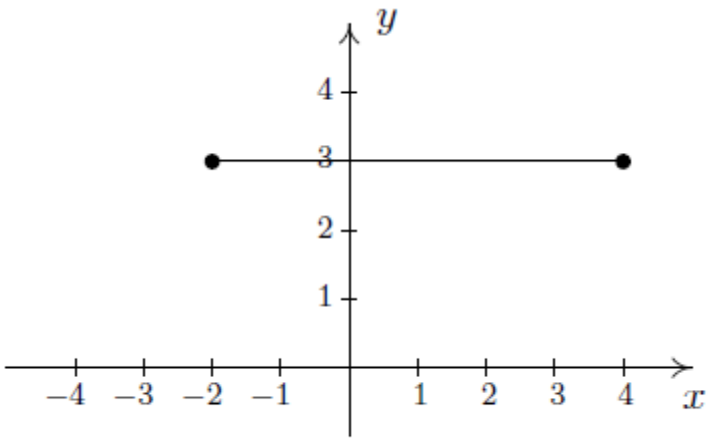
Graphical description

Example

- Graph the following relations
  1. A = { (0,0), (-3,1), (4,2), (-3,2)}
  2. HLS_1 = { (x, 3) | -2 ≤ x ≤ 4}



The graph of A



The graph of HLS_1

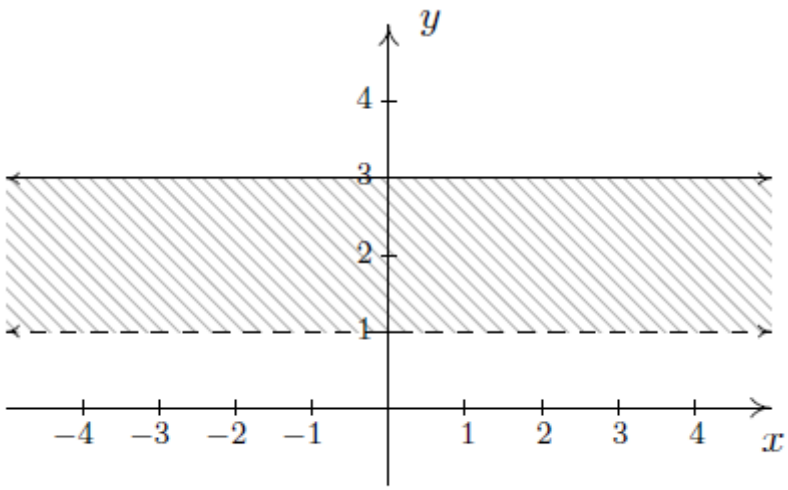
Equations of Vertical and Horizontal Lines

- The graph of the equation $x = a$ is a vertical line through $(a, 0)$. For any y value, the coordinate of the point on the line will by at (a, y).

- The graph of the equation $y = b$ is a horizontal line through $(0, b)$. For any x value, the coordinate of the point on the line will by at (x, b).

Example

- Graph the relation: R = { (x,y) | 1 < y ≤ 3 }
  (Note: y is restricted; no restrictions on x.)



The graph of R

Solid border means
y = 3 is included

Dashed border means
y = 1 is excluded

Graphs of Equations: The Fundamental Graphing Principle

- The graph of an equation is the set of points which satisfy the equation. That is, a point (x, y) is on the graph of an equation if and only if x and y satisfy the equation (make the equation true).

Intercepts

- A point at which a graph meets the x-axis is called an x-intercept of the graph.

- A point at which a graph meets the y-axis is called an y-intercept of the graph.

Steps for finding the intercepts of the graph of an equation

- Given an equation involving x and y:
- The x-intercepts always have the form (x,0)
  - To find the x-intercepts of the graph, set y = 0 and solve for x
- The y-intercepts always have the form (0,y)
  - To find the y-intercepts of the graph, set x = 0 and solve for y

Steps for testing if the graph of an equation possesses symmetry

- To test the graph of an equation for symmetry
- About the y-axis:
  - Substitute (-x, y) into the equation and simplify
  - If the result is equivalent to the original equation, the graph is symmetric about the y-axis
- About the x-axis:
  - Substitute (x,-y) into the equation and simplify.
  - If the result is equivalent to the original equation, the graph is symmetric about the x-axis.
- About the origin:
  - Substitute (-x,-y) into the equation and simplify
  - If the result is equivalent to the original equation, the graph is symmetric about the origin.