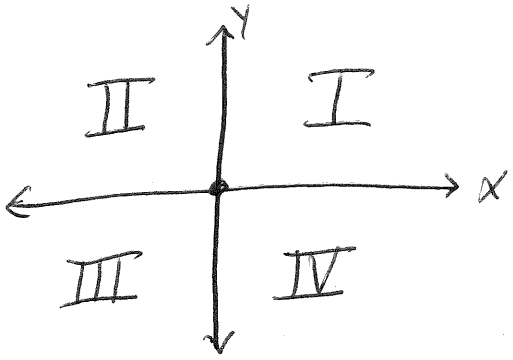
Section 3.1 - Graphing Using Rectangular Coordinates



Rectangular coordinates
= Cartesian Coordinates

* x, y axes
* origin (0,0)
* Quadrants go counter clockwise
* (x,y) = (x coordinate, y coordinate)

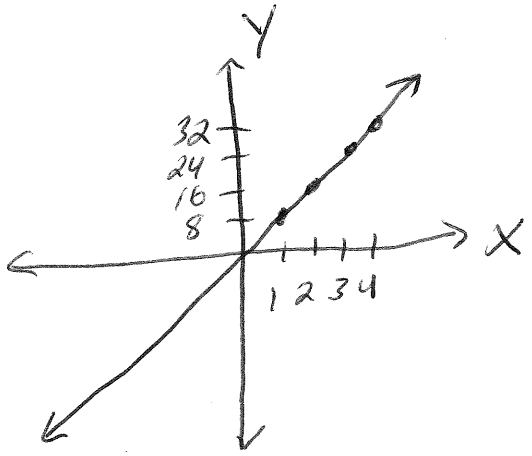
Ex) Plot the points and state quadrant

1) (4,4)
2) $(-1, -\frac{7}{2})$
3) (0, 2.5)
4) (-3,0)
5) (0,0)

Graph Paired Data

Ex)

Time (min)	Water (gal)
0	0
1	8
2	16
3	24
4	32



Ex) See Example 3, p. 190-191 in the text.

Ex) Plot data

t	dist
0	0
2	10
4	20
8	40

What is the distance at $t = 5$?

3.2 - Graphing Linear Equations

Ex) Is $(-1,-2)$ a solution to $y = x-1$?

Ex) Is $(-5,2)$ a solution of $y = 5x+1$?

For the following, complete the solution:

$(-5, \_\_)$ solves $y = -2x+3$

$(-2, \_\_)$ solves $y = 4x-2$

Ex) Consider $3x+2y=5$, Complete the tables:

x	y	(x,y)
7	—	(7,)
—	4	(, 4)

and

x	y	(x,y)
—	-2	(, -2)
5	—	(5,)

For $x-2y=8$

x	y	(x,y)
3		
	5	
4		

For $8x-4y=-16$

x	y	(x,y)
2		
	3	
4		

Construct a table of values for the following:

1) $3x+4y=6$ for 5 values
2) $2x-3y=1$ for 4 values
3) $3x-5y=10$ for 3 values

Use the tables from 1,2,3 above to graph the lines.

Standard Form: $Ax + By = C$

Linear functions have exponent 1 for each variable.

Are the following functions linear?

$x^2 + 3$

$x^2 + y^2 = 25$

$y = \frac{1}{x}$

$y = 2x + 5$

Plot $y = -3x$

Plot $2x + 3y = -12$ by solving for y.

Section 3.3 - Intercepts

Ex) $y = 2x - 4$ find x, y ints (graphically)

x-intercept - Where graph crosses x-axis

y-intercept - Where graph crosses y-axis

Graph $y = 3$, $y = x + 1$, $y = 3 - x$

To find intercepts:

y-intercept: Plug in 0 for x and solve for y, $(0, y)$

x-intercept: " " for y and " " x, $(x, 0)$

Ex) Find intercepts of

$x - 3y = 6$

$4x - 2y = 12$

$2x + 5y = -1$

$3x = -5y + 8$

$8x = -4y + 15$

Horizontal Lines

$y = 3$, $y = 4$, $y =$ number

For any x, y stays the same

Graph $y = 3$
$y = -1$

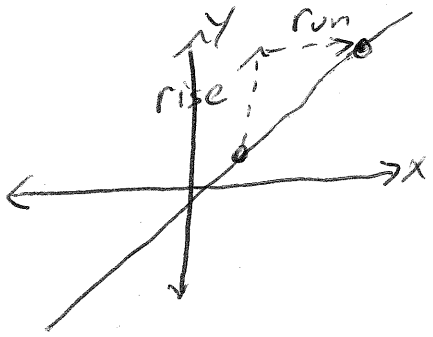
Vertical Lines

$x = 3$, $x = -1$, $x =$ number

For any y, x stays same

Graph $x = 2$
$x = -3$

3.4 - Slope



rise = vertical change
run = horizontal change

$y = mx + b$ (Slope-intercept form)

m = slope
b = y-int

$$m = \text{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

for $x_2 \neq x_1$

Steps

1. Pick two points on the line
2. Draw The triangle between points
3. Find $\frac{\text{rise}}{\text{run}} = m$

rise $\uparrow +$ $\downarrow -$ run $\rightarrow +$ $\leftarrow -$

Alternatively if given (x_1, y_1) and (x_2, y_2)

use $m = \frac{y_2 - y_1}{x_2 - x_1}$

Ex) $(1,2)$ and $(3,8)$ $\quad$ $(-1,-2)$ and $(1,-7)$

$(-2,4)$ and $(5,-6)$ $\quad$ $(3,8)$ and $(4,-3)$

$m > 0 \Rightarrow$ positive slope

$m < 0 \Rightarrow$ negative slope

Slope for horizontal line is $m = 0$

" " vertical line is $m =$ undefined.

Parallel Lines: slopes are equal $(m_1 = m_2)$

Perpendicular Lines: slopes are negative reciprocals $(m_1 m_2 = -1)$

Ex) Using the two sets of coordinates to see if the lines are perpendicular, parallel or neither.

(A) Line 1 $(-1,8)$ and $(-6,8)$

Line 2 $(3,3)$ and $(3,7)$

(B) $(6,4)$ and $(2,5)$

$(-2,-3)$ and $(2,-4)$

Section 3.5 - Slope Intercept Form

Write the following lines in slope intercept form. State m, and y-int.

1) $8x + y = 9$

2) $x + 4y = 16$

3) $-9x - 3y = 11$

4) $6y = 36$

Ex) Graph the 4 lines above.

Exercise: Graph

$y = 5x - 4$
$y = 2x - 3$

$4x + 3y = 6$
$6x - 2y = 14$

Use Slope intercept form to see if the lines below are parallel, perpendicular or neither

(A) $y = -5x + 6$
$y = 4x + 6$

(B) $x - 5y = -10$
$x - 4y = -8$

Word Problems: See Example on p. 236.

Section 3.6 - Point Slope

Point Slope Formula: $y - y_1 = m(x - x_1)$

Ex) Write equation of the line given

a) $m = -8$, $(-1, 5)$
b) $m = \frac{2}{3}$, $(5, -2)$
c) $m = \frac{-3}{2}$, $(6, -9)$
d) $m = -\frac{1}{4}$, $(-3, -4)$

Ex) Calculate m then use point slope

a) $(-2, 6)$ and $(4, 7)$
b) $(-5, 4)$ and $(8, -6)$
c) $(3, -2)$ and $(4, 1)$
d) $(-6, 3)$ and $(2, 10)$

Word Problems: See Example on p. 244.

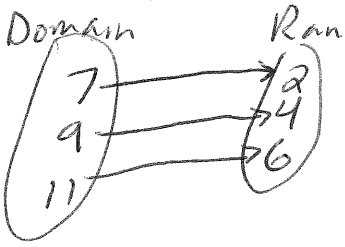
3.8 - Functions

Domain: values functions take in (x values)
Range: outputs of functions (y values)

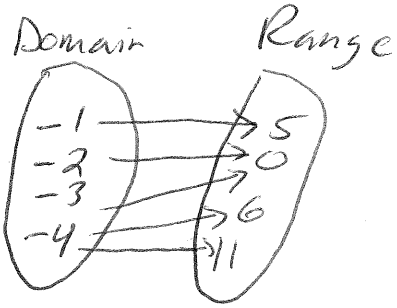
As data, $\{(1,7),(2,3),(3,8),(4,6)\}$ is a function
$\{(1,7),(2,3),(2,8),(4,16)\}$ is not a function

So $y = f(x)$ is a **function** of x given a relation for x and y if for each x there is **exactly** one y in the range.

Ex)



x	y
2	3
5	7
2	1
6	5

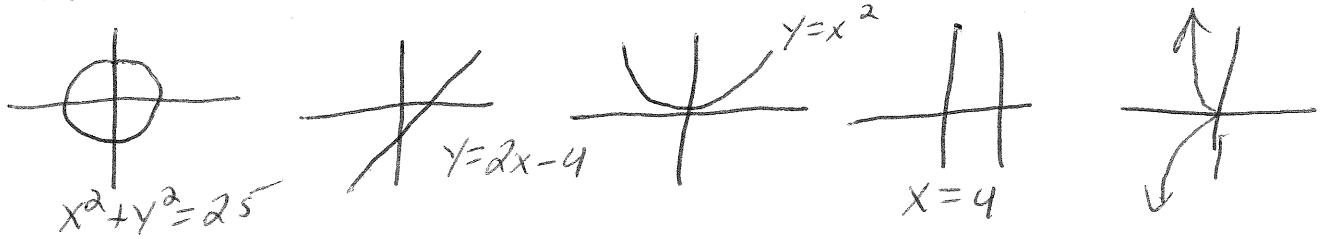


Ex) $f(x) = 5x + 7$ Find $f(4), f(-3), f(t)$

Ex) $g(x) = 3 - 2x$
$h(x) = x^3 + x^2 - 1$
$j(x) = x^4 + x^2 + 1$

Graph $f(x) = 4x + 1$
$f(x) = |x|$
$f(x) = |x| + 2$

Vertical Line Test: If a vertical line intersects a graph in more than one place, then the graph is not a function. Are these functions?



The function $C(h) = 80 + 15(h-4)$ gives cost to rent for an inflatable jumper for (4 hours min) h hours.

Find cost of 10hr rental?

12hr rental?

Section 4.1 - Systems of Equations by graphing.

Ex) Is $(-2, 5)$ a soln to $\begin{cases} 4y = 18 - x \\ y = 2x \end{cases}$

$\begin{cases} 3x + 2y = 4 \\ x - y = -7 \end{cases}$

Solve by Graphing:

$\begin{cases} 2x + 3y = 2 \\ 3x - 2y = 16 \end{cases}$ $\quad$ $\begin{cases} 2x - y = 5 \\ x + y = -1 \end{cases}$

$\begin{cases} y = -2x - 6 \\ 4x + 2y = 8 \end{cases}$ $\quad$ $\begin{cases} y = \frac{3}{2}x \\ 3x - 2y = 6 \end{cases}$

$\begin{cases} y = 2x + 4 \\ 4x + 8 = 2y \end{cases}$ $\quad$ $\begin{cases} 6x - 4 = 2y \\ y = 3x - 2 \end{cases}$

You can identify # of solutions without graphs

Same slopes, different intercepts $\Rightarrow$ No solutions

Same slopes, Same slopes $\Rightarrow$ Infinite solns

different slopes $\Rightarrow$ 1 solution.