Sec 7.2

Linear Functions and their graphs.

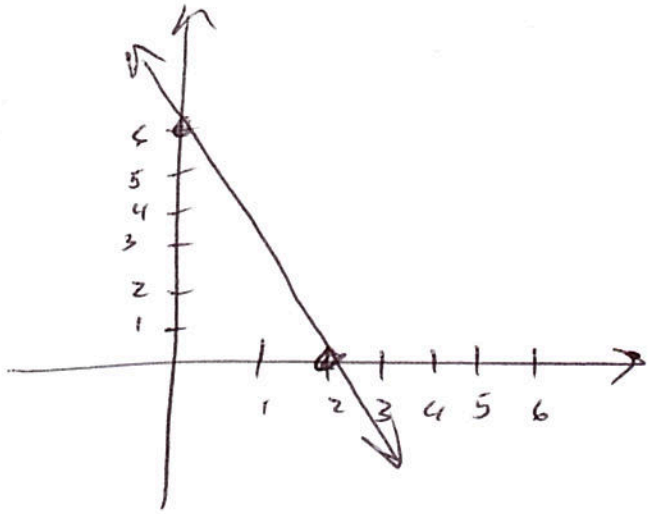
Suppose $f(x) = -3x + 6$

we could write $y = -3x + 6$

or $3x + y = 6$

All equations of this form $Ax + By = C$ are <u>linear equations in two variables</u>

The x-coord where such a graph crosses the x-axis is an x-intercept. The y-coord of the point where the graph crosses the y-axis is the y intercept.



$3x + y = 6$

x - intercept

set $y = 0$

$x = 2$

x - intercept

set $x = 0$

$3(0) + y = 6$

$y = 6$

Sec 7.2

Example: Use intercepts to graph

$2x + 4y = 12$

x int

set $y = 0$

$2x + 4(0) = 12$

$2x = 12$

$x = 6$

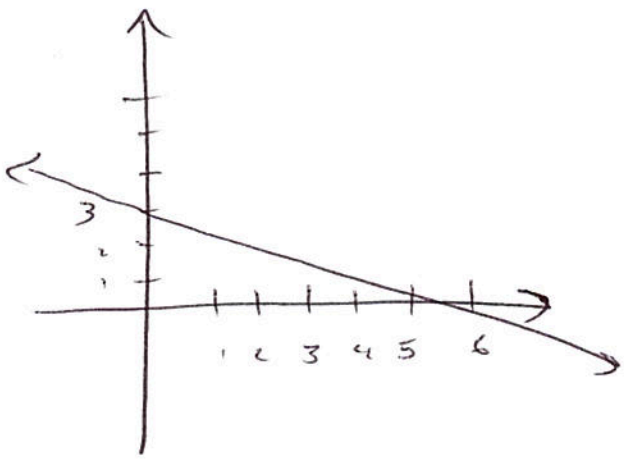
y int

set $x = 0$

$2(0) + 4y = 12$

$4y = 12$

$y = 3$



Slope

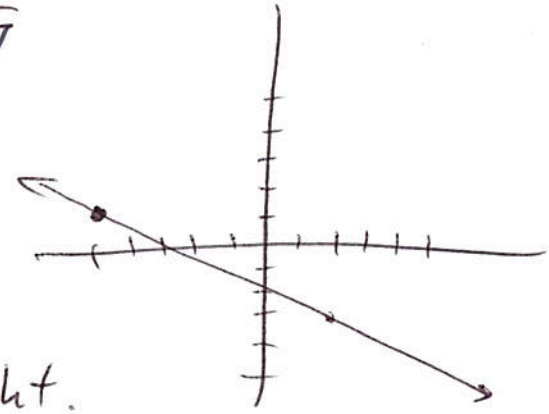
slope is a measure of the steepness of a line.

The slope of the line through two distinct points (x_1, y_1) and (x_2, y_2) with $x_1 \neq x_2$ is given by

$$\frac{\text{change in } y}{\text{change in } x} = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2}$$

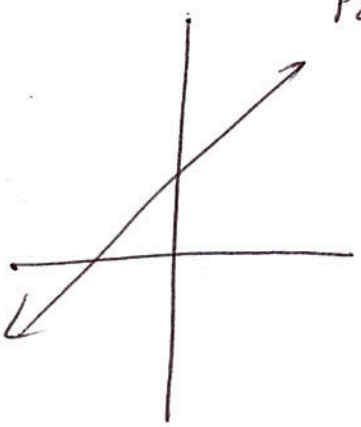
Example: Find the slope of the line through $(-5, 1)$ and $(2, -3)$.

$$m = \frac{-3-1}{2-(-5)} = \frac{-4}{7} = \frac{-4}{7}$$

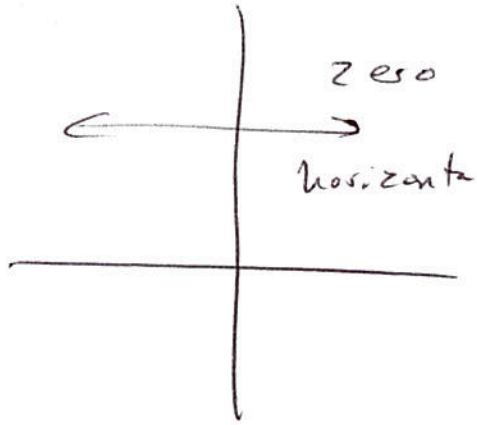


Negative slope

Down-hill left to right.

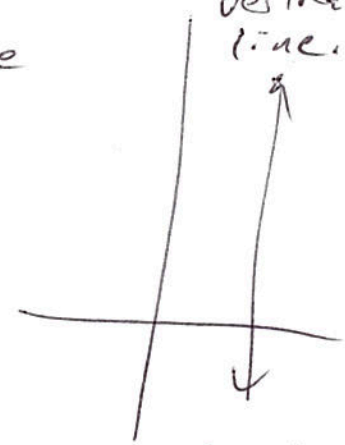


Positive slope



zero slope

horizontal line



vertical line.

undefined slope

Sec 7.3

The <u>slope intercept form</u> of the equation of a nonvertical line with slope m and y-intercept b is

$$y = mx + b.$$

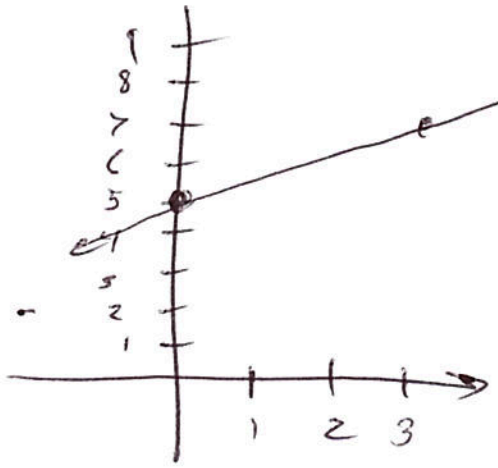
$$f(x) = mx + b.$$

Example

$$y = \frac{2}{3}x + 5.$$

slope is $\frac{2}{3}$

y-intercept is 5



over 3 up 2

(3, 7) is on line

Sec 7.2

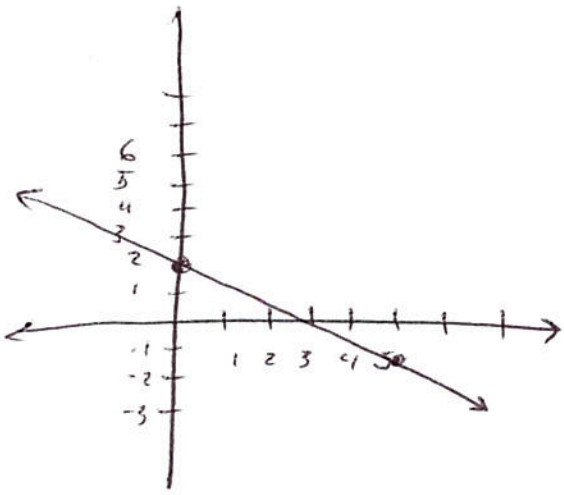
Example: Find the slope and y-intercept and graph the line.

$$3x + 5y = 10$$

$$5y = -3x + 10$$

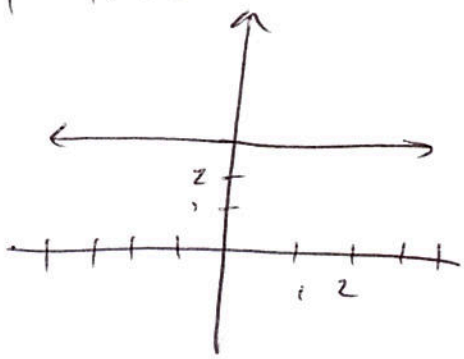
$$y = \frac{-3}{5}x + 2$$

slope: $-\frac{3}{5}x$ y-int 2



Horizontal line

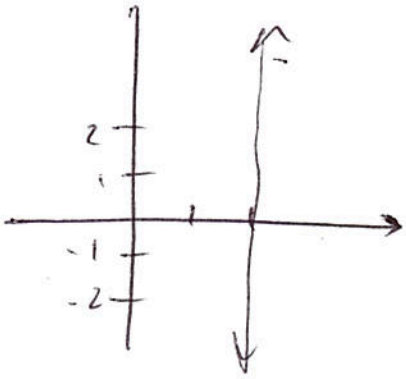
$y = 3$



$f(x) = 3$

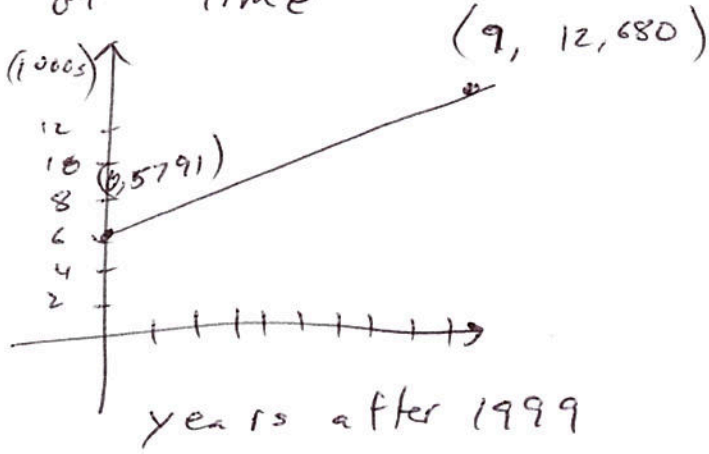
Vertical Line

$x = 2$



Section 7.2

Example 8 gives data about insurance premiums as a function of time



Find the <u>rate of change</u> of premiums in \$/year.

$$\frac{12\,680 - 5791}{9-0} = \frac{6889}{9} = 765.\overline{4}$$

About \$765.4 per year.