

Math 142 Lecture Notes Section 1.2 – Graphs and Lines

★ Cartesian Coordinate System

Definitions:

- 1) rectangular coordinate system:
- 2) origin:
- 3) quadrants:
- 4) ordered pair:
 - a) abscissa
 - b) ordinate
- 5) fundamental theorem of analytic geometry:

★ Linear Equation in Two Variables

Standard Form: $Ax + By = C$

- 1) solution:
- 2) solution set:
- 3) graph of an equation:

Linear Equation in Two Variables: The graph of $Ax + By = C$, where $A, B,$ and C are real numbers (A and B cannot both be zero) is a **straight line**, and any line is the graph of an equation of this form.

Write the equations of the vertical and horizontal lines that pass through the point (3,-1).

- 1) vertical line _____
- 2) horizontal line _____

★ Intercepts:

Definitions:

- 1) x-intercept: $(a,0)$ where the graph crosses the x-axis
- 2) y-intercept: $(0,b)$ where the graph crosses the y-axis

Example 1: Sketch the graph of : $6x + 2y = 12$.

X	Y	
0		y-intercept
	0	x-intercept
		Check point

Example 2: Graph $6x + 2y = 12$ on a graphing calculator

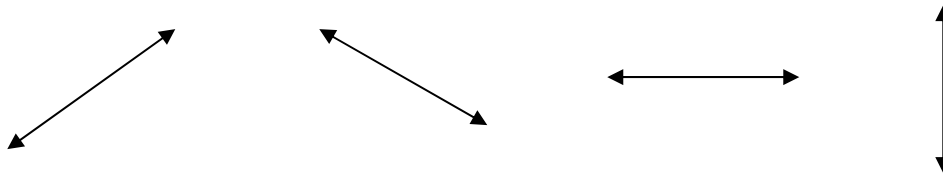
- a) Solve for y
- b) $y_1 =$ _____
- c) Trace, and Zero: to find intercepts on the graphing calculator.

★ Slope of a Line

Slope provides a measure of the steepness of a line. It is the ratio of the change in y to the change in x as the point moves from point P_1 to point P_2 .

Slope of a Line: If a line passes through $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$, then its slope is defined by the formula: $m = \frac{y_2 - y_1}{x_2 - x_1}, x_2 \neq x_1$

Geometric interpretation of slope:



Slopes: Find the slope of the line passing through the points:.

- 1) $(4, -2)$ and $(-8, 5)$
- 2) $(3, -1)$ and $(6, -1)$
- 3) $(5, 4)$ and $(5, -2)$

Special Forms:

$y = mx + b$ is called the *slope-intercept form* of a line.

State the difference between the lines, and what they have in common.

- $y_1 = 3x - 2$ $y_1 = 3x - 2$
- $y_2 = 3x - 5$ $y_2 = -3x - 2$
- $y_3 = 3x + 1$ $y_3 = 6x - 2$

Supply and Demand

Year	Supply	Demand	Price / crate of 8 air filters
2004	2850	2465	\$ 2250
2005	2050	2665	\$ 1850

Use the figures in the table above which give the number of boxes supplied or demanded at each price for each of the following questions. Let x represent the number of crates, and p the price per crate.

- Find the price-supply equation.
- Find the price-demand equation.
- Since each crate contains 8 air filters, find the number of air filters the company needs to produce at the equilibrium point.
- Find the price for each air filter, for the company at the equilibrium point.

★ Applications

Important Terms

- a) costs and revenues
- b) price-supply, price-demand, equilibrium point
- c) fixed costs, variable costs, and total costs