Mini-Lecture 1.5

Rectangular Coordinates and Graphs of Equations

Learning Objectives:

1. Plot points in the rectangular coordinate system.
2. Determine whether an ordered pair is a point on the graph on an equation.
3. Graph an equation using the point-plotting method.
4. Identify the intercepts from the graph of an equation.
5. Interpret graphs.

Preparing for Rectangular Coordinates and Graphs of Equations:

i) Determine whether $x = 1$ is a solution to the equation: $3 - 4(2x - 5) = -9$.

ii) Solve the equation for y: $2x - 5y = -10$.

DEFINITION

The **graph of an equation in two variables** x and y is the set of all ordered pairs (x, y) in the xy-plane that satisfy the equation.

Examples:

1. Determine whether the given point is on the graph of the equation.

a) $4x - 3y = -3$; $(-3, -3)$

$4(-3) - 3(-3) = -3$

$-12 + 9 = -3$

$-3 = -3$

YES

b) $y = -x^2 + 2$; $(-2, 6)$

$6 = -(-2)^2 + 2$

$6 = -4 + 2$

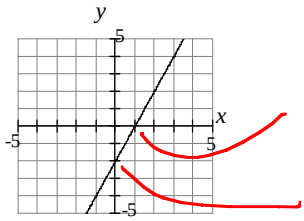
$6 = -2$

NO

DEFINITION

The **intercepts** are the points, if any, where a graph crosses or touches the coordinate axes. The x-coordinate of a point at which the graph crosses or touches the x-axis is an ***x*-intercept,** and the y-coordinate of a point at which the graph crosses or touches the y-axis is a ***y*-intercept.**

2. The graph of an equation is given. List the intercepts.



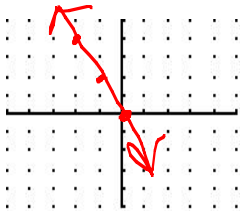
x-int: (1,0)

y-int (0,-2)

3. Graph the equation by plotting points.

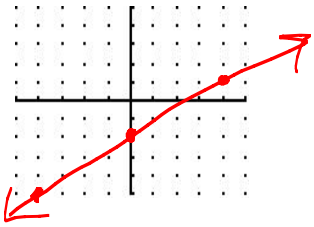
a) $y = -2x$

x	y
-2	4
-1	2
0	0



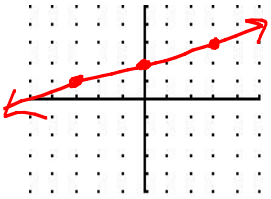
b) $y = \frac{3}{4}x - 2$

x	y
4	1
0	-2
-4	-5



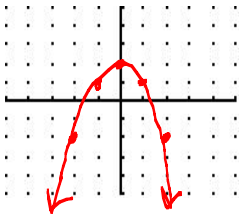
c) $x - 3y = -6$

x	y
3	3
0	2
-3	1



d) $y = -x^2 + 2$

x	y
-2	-2
-1	1
0	2
1	1
2	-2



$x = -2$

$y = -(-2)^2 + 2$

$y = -4 + 2$

$y = -2$

e) $y = |x - 3|$

x	y
1	2
2	1
3	0
4	1
5	2

4. If $(a, -5)$ is a point on the graph of $3x + y = -2$, what is a?

$$3a + -5 = -2$$
$$3a = 3$$
$$a = 1$$

5. If $(2, b)$ is a point on the graph of $y = x^2 - 3x + 1$, what is b?

$$b = 2^2 - 3(2) + 1$$
$$b = 4 - 6 + 1$$
$$b = -2 + 1$$
$$b = -1$$