Chapter 2: Linear Equations/Inequalities in two variables.

I. Introduction to the Rectangular (Cartesian) Coordinate System
II. Linear Equations in 2-variables
III. Graphing Using Intercepts
IV. Two Special Lines
V. Slope
VI. Slope-intercept Form
VII. Point-Slope Form
VIII. Finding Equations of Lines
IX. Inequalities of two-variables
I. Introduction to the Rectangular (Cartesian) Coordinate System

Recall: Plot $x = 3$.

To plot points, we use two axes.

We will plot points (or ordered pairs): $(x, y)$ which consists of two numbers called coordinates.
**Exercise:** Plot the following points. Identify the quadrant each point lies.

1) (3,5)       5) (-4, -3)
2) (5,3)       6) (3, 0)
3) (-2,4)       7) (0,-3)
4) (2,-4)
Exercise: The table below shows the altitude $y$, in feet, of a smaller plane that has departed an airport in $x$ minutes.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>3,500</td>
</tr>
<tr>
<td>20</td>
<td>4,000</td>
</tr>
<tr>
<td>30</td>
<td>3,000</td>
</tr>
<tr>
<td>40</td>
<td>2,500</td>
</tr>
<tr>
<td>50</td>
<td>2,500</td>
</tr>
<tr>
<td>60</td>
<td>1,000</td>
</tr>
<tr>
<td>70</td>
<td>0</td>
</tr>
</tbody>
</table>

1) Plot the above points.
Exercise Continued ...

2) What was the highest altitude of the plane?

3) How long after departure did the plane reach the highest altitude?

4) When was the altitude of the plane increasing?

5) How long was the flight?
II. Linear Equations in 2-variables

**Standard Form of a Linear Equation of 2-variables**

\[ Ax + By = C, \text{ where } A, B, \text{ & } C \text{ are constants.} \]

Consider \( x - 3y = 1 \).

**Exercise:** Which are solutions of the above equation.

1) (4,1)  
2) (1,4)  
3) (-2,-1)

**Question:** How many solutions does the equation \( x - 3y = 1 \) have?
**Exercise:** Find three more solutions to \( x - 3y = 1 \).
**Exercise:** List all the solutions we found and use them to graph $x - 3y = 1$. 
**Exercise:** \( y = 2x - 3 \)
Find 3 points & use them to graph the equation.
**Exercise:** $y = 2x$
Find 3 points & use them to graph the equation.
**Exercise:** Graph $3x + 5y = 20$. 
Question: How many points do we need to graph a line?

Question: Why plot 3 points?
Chapter 2 Homework

Part I: Introduction to the Rectangular Coordinate System

1) What quadrant is the point (1, 4) in?

2) What quadrant is the point (-1, 4) in?

3) What quadrant is the point (1, -4) in?

4) What quadrant is the point (-1, -4) in?

5) Plot the data from the table shown to the right and then answer the questions that follow.

Data for 5)

<table>
<thead>
<tr>
<th>Year</th>
<th>Median Household income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>$53,000</td>
</tr>
<tr>
<td>2001</td>
<td>$52,000</td>
</tr>
<tr>
<td>2002</td>
<td>$51,000</td>
</tr>
<tr>
<td>2003</td>
<td>$51,000</td>
</tr>
<tr>
<td>2004</td>
<td>$51,000</td>
</tr>
<tr>
<td>2005</td>
<td>$52,000</td>
</tr>
<tr>
<td>2006</td>
<td>$52,000</td>
</tr>
<tr>
<td>2007</td>
<td>$53,000</td>
</tr>
<tr>
<td>2008</td>
<td>$51,000</td>
</tr>
<tr>
<td>2009</td>
<td>$51,000</td>
</tr>
<tr>
<td>2010</td>
<td>$49,000</td>
</tr>
</tbody>
</table>
Plot data here for 5)

a) By how much did the median household income decrease from 2007 to 2010?

b) In which year or years shown was the median household income the highest?

c) In what years was the median household income less than $50,000?

d) In what years was the median household income greater than $51,000?
Part II: Linear Equations in Two Variables

6) Determine whether the equation $3x - 2y = 5$ has the given ordered pair as a solution.

   a) (1,1)  b) (1,-1)  c) (-1,-4)  d) (0,-5/2)

7) Find three solutions to the equation $4x + y = 3$ and then graph the equation.

8) Find three solutions to the equation $x = 2y + 1$ and then graph the equation.