Name:

Section:

Date assigned: Monday, 8/24 Date due: Friday, 8/28

Instructions:

- This problem set will be graded on completion. Please complete this problem set on your own. The reason why I do not want you to work with others is so that I can identify whether you are struggling with the material and provide you with the help you need.
- This problem set is designed to give you some practice on the four basic mathematical skills that you will need this semester: graphing and understanding lines, finding the slope of a line, solving a system of two linear equations, and finding intersections of two lines.
- This problem set has three questions, some with multiple parts. I have included a brief review of the concept before each question. Feel free to ignore the review and proceed straight to the questions if you are comfortable with the material.

1: Graphing and understanding lines

In economics, we frequently utilize graphs to help us in our analysis. In particular, in this class, we will graphing many lines. A line may be mathematically represented using the equation

$$y = mx + c$$

where m represents the slope of the line and c represents the intersection of the line with the y-axis. For example, the line

$$y = 4x + 20$$

plots out all points (x, y) with a slope of 4 and an intersection at (0, 20). If you are given the equation of a line and one coordinate (say, x = 5), you can find the corresponding y-coordinate on the line by plugging in the value of x = 5 into the equation:

$$y = 4x + 20$$

$$\implies y = 4(5) + 20$$

$$\implies y = 40$$

Now, graph the following lines placing x on the horizontal axis and y on the vertical axis. For this assignment, your graphs need not be drawn to scale. However, the graphs should show whether the slope is positive or negative and show the y-axis intersection.

- 1. y = 6x + 3
- 2. 4 = 3x + 2y
- 3. y = 7
- 4. $I = p_x x + p_y y$ (Hint: while we don't know I, P_x , or P_y , pretend that we do and treat them as if they were positive constants).

2: Finding the slope of a line

Given two points, we may draw a straight line that connects the both of them. We may want to find the slope of this line. Given two points $A = (x_1, y_1)$ and $B = (x_2, y_2)$, the slope of the line is given by

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{"rise"}}{\text{"run"}}$$

A positive value of m means that the line is upward-sloping, a negative value of m means that the line is downward-sloping.

Now, find the slope of the line that connects the following two points:

1. A = (0, 10), B = (5, 20)

2.
$$A = (5,3), B = (6,1)$$

3: Solving a system of two equations

In economics we often have to solve a system of equations. For example, we might have two equations and two variables and we will want to solve for (i.e. find values for) the two variables.

- 1. y = 5x, x = 3y + 4
- 2. Q = 23 5P, Q = 4 + 2P
- 3. Y = 24, X = 14 0.5Y
- 4. Q = A BP, Q = C + DP, solve for P and Q in terms of A, B, C, and D. (Hint: Treat A, B, C, D as if they were numbers.)

4: Finding the intersection of two lines

A geometric interpretation of solving a system of two linear equations is the following: given two equations representing lines, solving the system of equations amounts to finding the intersection point of those two lines. This will be very useful, as we will see later in the semester.

Now, graph the two lines y = 5x and x = 3y + 4 and indicate where they intersect. Solve for the point of intersection.