

Economics 102  
Spring 2017  
Homework #1  
Due February 9, 2017

**Directions:**

- The homework will be collected in a box **before** the lecture.
- Please place **your name, TA name** and **section number** on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade.
- Late homework will not be accepted so make plans ahead of time.
- **Show your work.** Good luck!

**Please realize that you are essentially creating “your brand” when you submit this homework. Do you want your homework to convey that you are competent, careful and professional? Or, do you want to convey the image that you are careless, sloppy, and less than professional. For the rest of your life you will be creating your brand: please think about what you are saying about yourself when you do any work for someone else!**

**Part I: Math Review**

1. For this question use a linear equation that takes the form of  $y = ax + b$ .
  - a) Write the equation of the straight line that passes through the points  $(x; y) = (4; -9)$  and  $(-2; 15)$ . Graph this equation. What is the value of the slope of your equation? What is the value of the y-intercept?
  - b) Write the equation of the straight line that passes through the point  $(x; y) = (6; -7)$  and has slope equal to  $1/3$ . Graph this equation. What is the value of the y-intercept?
  - c) Write the equation of the straight line, line #1, that fits the following description. If we take this straight line, line #1, and shift this line down by 3 units (that is, the y-intercept for line #2 is 3 units less than the y-intercept for the original line) and make this new line (line #2) twice as steep as line #1, then the new line #2 passes through the origin and for every 4 unit increase in the X variable, the Y variable decreases by 2 units. Graph the initial equation. What is the value of the slope of this initial equation (line #1)? What is the value of the y-intercept for line #1?

2. Consider the following equations:

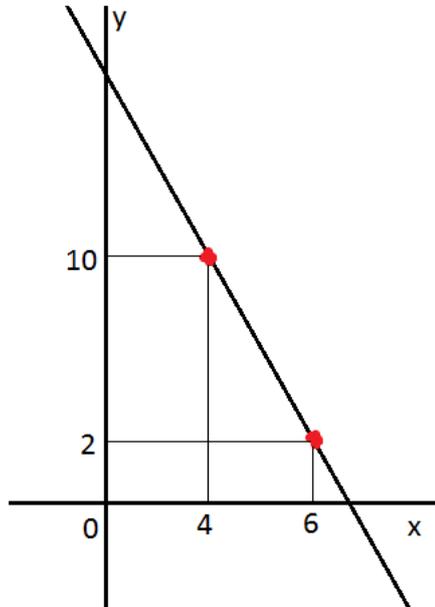
Equation 1:  $y = -0.5x + 3$

Equation 2:  $y = 1.5x - 5$

- a) Solve for the solution  $(x, y)$  for this system of equations. That is find the values of  $x$  and  $y$  where these two equations intersect with one another.
- b) Now shift the Equation 2 upward by 10 units. Solve for the solution  $(x', y')$  where equation 1 and the new modified equation 2' intersect with one another.

- c) In addition to the shift of equation 2 described in (b) equation 1 has shifted to the right by 8 units. Using equation 2' and equation 1', find the solution  $(x'', y'')$  where equation 1' and equation 2' intersect with one another.

3. Consider the following graph of the line.



- a) Write the equation of this line. What is the value of the slope of your equation? What is the value of the y-intercept?
- b) Consider the area under the point  $(4; 10)$  as the area of the rectangle between the origin and the point  $(4; 10)$ . This area is equal to 40. The area under the point  $(6; 2)$  is 12. What are the coordinates of the point under which the area is maximized if you consider only points located in the first quadrant?
4. Consider Ashley who is taking a class at UW-Madison.
- a) Ashley scored 82 out of 137 points for her first midterm. What is her score if that score is converted to a 100-point scale?
- b) Ashley scored 96 out of 137 points for her second midterm. What is the percentage change in her score from the first midterm to the second midterm?
- c) For the course Ashley is taking the first midterm, second midterm and final are worth 25, 25 and 50 percent of the total grade, respectively. Each score is out of 137 possible points and you have already been given the information about her midterm grades. Ashley's total weighted score is 99.3 out of 137 points. What is her score for the final exam out of 137 points? If you were to measure her final exam score on a 100-point scale, what would be her grade? What is the percentage change in her score between the first midterm and her final if you use the 137-point scale? Will your answer change if you use the 100-point scale instead to calculate the percentage change in her score between the first midterm and her final? Explain your answer.

## **Part II: Production Possibility Frontier**

5. Consider the United States and Colombia. Suppose that both countries have one million workers who could either grow cut flowers or produce cars. One American worker can grow 1,200 cut flowers or produce 12 cars. One Colombian worker can grow 1,200 cut flowers or produce 4 cars.
- a) Given the above information, what is the opportunity cost for the U.S. to produce an additional million cars in terms of millions of cut flowers?
  - b) What is the opportunity cost for the U.S. to produce an additional million cut flowers in terms of million of cars?
  - c) What is the opportunity cost for Colombia to produce one additional million of cars in terms of million of cut flowers?
  - d) What is the opportunity cost for Colombia to produce one additional million of cut flowers in terms of million of cars?
  - e) Which country has the comparative advantage in growing cut flowers? Explain your answer.
  - f) Which country has the comparative advantage in producing cars? Explain your answer.
  - g) Which country has the absolute advantage in producing cars?
  - h) Draw the Production Possibility Frontiers for the U.S. and Colombia. Label millions of cars on the x-axis and millions of cut flowers on the y-axis.
  - i) Now the U.S. and Colombia are engaged in trade with each other. Which country will export cut flowers? Which country will export cars?
  - j) Draw the joint PPF. Label millions of cars on the x-axis and millions of cut flowers on the y-axis. Write the equations for the joint PPF. Make sure you include the relevant ranges or domains for each equation you provide.
  - k) Assume that two countries produce 14 million cars. Which country produces the last million cars that are produced? How many million cut flowers will the two countries produce in all?
  - l) Illustrate the range of possible trading prices of 1 car in terms of cut flowers.