Economics 101
Fall 2018
Homework #1
Due Thursday, September 27, 2018

Directions:

- The homework will be collected in a box labeled with your TA's name **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.
- Please **staple** your homework: we expect you to take care of this prior to coming to the large lecture. You do not need to turn in the homework questions, but your homework should be neat, orderly, and easy for the TAs to see the answers to each question.
- Late homework will not be accepted so make plans ahead of time.
- Show your work. Good luck!

Part I: Math Review

1. For this question use a linear equation that takes the form of y = mx + b.
   a. Write the equation of the straight line that passes through the points (x; y) = (2; -14) and (-4; 19). 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, line #1, that fits the following description. If we take this straight line, line #1, and shift this line down by 2 units (that is, the y-intercept for line #2 is 2 units less than the y-intercept for the original line) and make this new line (line #2) four times as steep as line #1, then the new line #2 passes through the point (1; 3) and for every 2 unit increase in the X variable, the Y variable increases by 4 units. What is the value of the slope of the initial equation (line #1)? What is the value of the y-intercept for line #1?

   c. Using the equations that you got from (a) and (b), solve this system of equations for (x, y). Use the equation for line #1 from (b).

   d. Now shift the first equation from (a) to the left by 6 units and then solve the modified system of equations for (x', y'). Use the equation for line #1 from (b) and the new line based on this new information and your equation from (a).

2. Alexander purchases a new car for $15,000, and pays $5,000 as a down payment. He takes out a loan for the remaining $10,000 at 5%, compounded annually.
   a. How much does Alexander owe to the bank at the end of the first, second and third year if he doesn't make any payments to the bank?

   b. If Alexander wants to repay his loan as well as the interest that is due on the loan within a year, what does his monthly payment need to be?

   c. If Alexander pays $300 per month, could he repay his loan in two years? Three years?

3. Suppose the grading system for Econ 101 consists of the following components: 5 homework assignments that together account for 10% (each of them accounts for 2% of the final grade) of the student's final grade; two midterms each of them counting for 25% of the student's final grade; and a final exam that counts the remaining 40% of the student's final grade. Assume the scores on each assignment, midterm, and exam could range from 0 - 100. The table below presents the corresponding scores for 3 students in the class.

	Charlie	Bella	Erik
HW 1 (2%)	60	100	60
HW 2 (2%)	50	95	30
HW 3 (2%)	70	90	20
HW 4 (2%)	70	100	60
HW 5 (2%)	100	90	60
Midterm 1 (25%)	60	90	
Midterm 2 (25%)	80	90	40
Final (40%)		80	50
Total grade	74		

a. Compute the total grade for Bella.

b. What is the average score on Midterm 2?

c. What is Charlie's score on the Final Exam if his total grade at the end of the semester is 74?

d. What is Erik's score on Midterm 1 if the average score on Midterm 1 is 65?

4. Annika and Bertrand are in two rival clubs baking brownies (B) and cupcakes (C) for a bake sale. They can each devote 9 hours a day to baking. Annika can bake 9 brownies every hour or 24 cupcakes every 1.5 hours. Bertrand can bake 16 brownies every hour or 12 cupcakes every hour.

a. With brownies on the vertical axis and cupcakes on the horizontal axis, plot the production possibility frontiers for Annika and Bertrand on two separate graphs, and provide an equation for each of these graphs. Make sure your graphs are completely and clearly labeled.

b. What is the opportunity cost of 1 cupcake for Annika and Bertrand, in terms of the number of brownies? What about the opportunity cost of 1 brownie in terms of the number of cupcakes?

c. Who has the absolute advantage in the production of each good? Who has the comparative advantage in the production of each good?

d. Suppose that Annika and Bertrand want to trade brownies and cupcakes before the bake sale. In terms of cupcakes, what is the range of possible trading prices for 1 brownie in terms of cupcakes? In terms of brownies, what is the range of possible trading prices for 1 cupcake?

e. Plot and give an expression for the joint PPF of Annika and Bertrand.

5. Consider the small Island countries of Canopia and Dania. Canopia has a population of 200, and Dania has a population of 100. Being close to the Ocean, each country can only produce two goods – fish and coconuts. Assume that all citizens are employed. In a given month, Canopia can produce 10,000 fish or 4,000 coconuts or any combination of the two goods that lies on the line containing these two points. Meanwhile, Dania can produce 4,000 fish or 4,000 coconuts or any combination of the two goods that lies on the line containing these two points.

a. With fish on the vertical axis and coconuts on the horizontal axis, graph the PPF for these two countries and find the equations for each PPF.

b. What is the opportunity cost of 1 coconut for Canopia and Dania, in terms of the number of fish? What about the opportunity cost of 1 fish in terms of the number of coconuts?

c. Who has the absolute advantage in the production of each good? Who has the comparative advantage in the production of each good? Consider the size of the country (that is, calculate the production per person for each good in each country in order to answer this question) in your answer.

d. Plot and give an expression for the joint PPF of Canopia and Dania.

e. Suppose that there is a large storm near Dania that brings more fish to the waters, but destroys some of the coconut trees. 50 skilled fishermen from Canopia move to Dania to take advantage of the plentiful fish there, so now each country has a population of 150. Dania can produce 12,000 fish or 2,000 coconuts or any combination of the two goods that lies on the line containing these two points, and Canopia can produce 3,000 fish or 6,000 coconuts or any combination of the two goods that lies on the line containing these two points. With this new information, re-do parts (a) - (c). What has changed in part (c)?