**Economics 111**

**Fall 2019**

**Homework #1**

**Due Thursday, September 19, 2019**

**General Instructions:**

* Homework is due at the beginning of the lecture.
* Do not submit the homework questions. Just submit your answers: these answers should be neat, legible, and easy to follow. Be generous with your use of paper. Do not write in small, hard to read font. If asked to provide a graph, provide a generous graph.
* All homeworks should be stapled and on the front page your name should be legibly written.
* It is all right to do homework with a "study buddy": however, when asked to explain your answer your words should be significantly different from your "study buddy's" words. Homeworks that are too similar to one another will not receive any credit.
* To get full credit for the homework you need to answer every question that is asked. A failure to answer all the questions will result in a lower homework score.
* It is a good idea to make a copy of your homework so that you can compare your answers to the posted answers. Your copy (a digital photo) also provides a time-stamped proof that you did the homework.

**General Math Review:**

1. a. Suppose you know that the two points (X, Y) = (12, 6) and (15, 3) sit on the same line. From this information write an equation for this line in slope-intercept form.

b. Suppose that you know that the slope of the line is 5 and that this line also contains the point (20, 25). What is the y-intercept for this line? Show your work.

c. You are given the following two equations:

Y = 10X + 100

Y = 76 – 2X

Find the solution (X, Y) for where these two equations intersect. Show your work.

d. Suppose that you know that the relationship between X and Y, where X is the variable measured on the horizontal axis, can be described by the following equation:

X = 40 – 2Y for all values of X ≥ 0

You are then told that for every Y value the X value has now increased by 10 units. Write the equation in slope-intercept form for this new line. Show your work. Hint: you might find it helpful to draw a "sketch" illustrating these two lines before you start doing your calculations.

e. Suppose that you know that the relationship between X and Y, where X is the variable measured on the horizontal axis, can be described by the following equation:

Y = 10 + 4X for all values of X ≥ 0

You are then told that for every X value the Y value has now decreased by 20 units. Write the equation in slope-intercept form for this new line. Show your work. Hint: you might find it helpful to draw a "sketch" illustrating these two lines before you start doing your calculations.

f. Suppose that you are told that when the price of a good is $10 per unit people are willing to purchase 20 units of the good and when the price of the good is $5 per unit people are willing to purchase 30 units of the good. If P is the symbol for the price of the good and Q is the symbol for the quantity of the good, write an equation for this relationship assuming that it is a linear relationship. Assume that price is the y-variable and quantity is the x-variable and then provide the equation in y-intercept and x-intercept form.

1. a. Suppose you are given the following two points that sit on a straight line: (x, y) = (10, 2) and (5, 4)

What is the equation for this line in slope-intercept form? Show all your work in finding this equation.

1. Suppose you are asked to find the equation in slope-intercept form of a straight line that has slope = 4 and contains the point (100, 50). Find this equation, showing all the work you did.
2. You are given the two equations: y = 4x + 20

y = 100 – x

Find the (x, y) coordinate values where these two lines intersect each other. Show your work.

1. You are given the

equation: y = 10 – 2x for y ≤ 10

Draw a sketch of this line for all values of x and y that are ≥ 0. Label this line 1. Now, suppose that for every y value, the x value doubles. Draw this new line in your graph showing just the values of x and y that are ≥0. Label this line 2. Write an equation for line 2 showing your work.

1. You are given the equation: y = 10 – 2x for y ≤ 10

and told that for every x value in this original equation, the y value has increased by 10 units. Draw a graph that illustrates the original line as well as this new line. Label these two lines Line 1 and Line 2, respectively. Then, write the equation for Line 2 and provide a verbal explanation for how you found this new equation.

3. More math review:

Consider three individuals who are enrolled in Professor Kelly's Econ 101 class: Howard, Sue, and Mike. In class Professor Kelly has emphasized the importance of turning in the homework and despite this advice these three individuals have taken decidedly different approaches. Professor Kelly anticipates that students will need to earn a total of 90 points on a 100 point scale from the various assignments for the semester in order to earn an A in the class. The assignments are as follows:

* Five homework assignments that are each worth 2 points: if a student turns in all five homeworks and shows good effort they will earn 10 points on that 100 point scale from this effort. If they turn in four homeworks that show good effort they will earn 8 points on that 100 point scale from this effort. And, so on. If the student turns in none of the homeworks, they will earn 0 points on that 100 point scale.
* Two midterms that contribute 25% each to their weighted score total. So, for instance if a student scores a 50 on each of these two midterms they will get 12.5 points on a 100 point scale from each of these exams (a total of 25 points on that 100 point scale from these two exams).
* A final that contributes 40% to their weighted score total. (Note that we have now accounted for 100% of that weighted score total.) If a student scores a 70 on the final, the student will get 28 points on a 100 point scale from this final.

Here is the data you have for Howard, Sue, and Mike. You are asked to calculate the score each of these individuals needs on the final exam (assume it is a 100 point final exam) in order to get an A in the class. Show your work for each calculation. For some individuals you may find that it is impossible to earn that "A" in the class.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Howard** | **Sue** | **Mike** |
| Number of Homeworks turned in | 0 | 3 | 5 |
| Score per Homework Submitted | 2 | 2 | 2 |
| Score on First Midterm out of a Possible 100 Points | 84 | 84 | 84 |
| Score on Second Midterm out of a Possible 100 Points | 88 | 88 | 88 |
| Score Needed on Final out of a Possible 100 Points to Earn an "A" in the class |  |  |  |

**Production Possibility Frontiers:**

4. Suppose that there are three countries that produce popcorn (P) and juice (J): Merryland, Happyland, and Sedateland. The maximum amount of popcorn and juice each country can produce if they only produce that one good is given in the table below. Use this information to answer this set of questions. Assume that each of the three countries have constant opportunity costs with respect to the production of popcorn and juice: that is, each country has a linear production possibility frontier.

|  |  |  |
| --- | --- | --- |
| **Country** | **Maximum Amount of Popcorn Production Possible** | **Maximum Amount of Juice Production Possible** |
| Merryland | 10 units of popcorn | 20 units of juice |
| Happyland | 10 units of popcorn | 10 units of juice |
| Sedateland | 5 units of popcorn | 20 units of juice |

a. Given the above information, what is Sedateland's opportunity cost of producing one more unit of popcorn?

b. Given the above information, what is Happyland's opportunity cost of producing one more unit of juice?

c. Given the above information, rank these three countries in order of their comparative advantage in the production of popcorn. List the order from the country with the greatest comparative advantage to the country with the least comparative advantage.

d. Given the above information, rank these three countries in order of their comparative advantage in the production of juice. List the order from the country with the greatest comparative advantage to the country with the least comparative advantage.

e. Construct the joint PPF for these three countries if they specialize according to comparative advantage. For this joint PPF measure popcorn on the vertical axis and juice on the horizontal axis. After constructing this joint PPF, provide the coordinates of any intercept or "kink point" in your diagram. Then write the equation for each segment of the joint PPF and provide a range or domain for each segment.

f. Consider each of the production combinations given in the table below and decide whether this production combination is possible if these three countries specialize according to comparative advantage and then trade with one another. Enter your answer as a "Yes, this combination lies on the joint PPF", "Yes, this combination lies inside the joint PPF" or "No, this combination lies outside the joint PPF" in the provided column.

|  |  |  |  |
| --- | --- | --- | --- |
| Combination | Amount of Units of Popcorn in Combination | Amount of Units of Juice in Combination  | Is this Combination a Possible Production Combination for these Three Countries? |
| A | 22 | 12 |  |
| B | 22 | 8 |  |
| C | 20 | 22 |  |
| D | 15 | 30 |  |
| E | 3 | 48 |  |

5. Helen and Charlie produce windows (W) and doors (D). The table below provides information about how many hours of labor they need individually to produce a window or a door. Assume that they only need labor to produce these two goods and assume that both Helen and Charlie have linear PPFs.

|  |  |  |
| --- | --- | --- |
|  | Number of Hours of Labor Needed to Produce One Window | Number of Hours of Labor Needed to Produce One Door |
| Helen | 2 hours of labor | 1 hour of labor |
| Charlie | 4 hours of labor | 5 hours of labor |

a. Suppose that Helen and Charlie each have 40 hours a week that they can devote to producing windows and doors. In two separate graphs draw Helen's and Charlie's production possibility frontiers: label each graph clearly and completely. In your graphs, measure doors on the vertical axis and windows on the horizontal axis.

b. Given the above information, who has the comparative advantage in the production of doors? Explain your answer.

c. Given the above information, who has the comparative advantage in the production of windows? Explain your answer.

d. Given the above information, fill in the following table:

|  |  |  |
| --- | --- | --- |
|  | Opportunity Cost of Producing One More Window | Opportunity Cost of Producing One More Door |
| Helen |  |  |
| Charlie |  |  |

e. Based upon Helen and Charlie each having forty hours of labor available per week, construct the joint PPF for these two individuals if they decide to specialize and trade with one another. In your graph measure doors on the vertical axis and windows on the horizontal axis. Make sure that the coordinates of all kink points are identified.

f. Given the joint PPF you constructed in (c), write the equation(s) for each segment of this joint PPF. Make sure you identify either the relevant range or domain for any equation you provide.

g. Using the number line approach discussed in class show the range of acceptable trading prices for 5 windows if Helen and Charlie specialize according to comparative advantage and then trade with one another.

6. The graph below depicts the production possibility frontier for a small economy that produces only buckets (B) and ladders (L). This PPF is linear between any two adjacent points on the PPF: e.g., the PPF is linear between points A and B, between points B and C, and between points C and D….



a. Suppose this economy is currently producing at point B. What is the opportunity cost of producing one additional bucket given this information? Explain your answer. Make sure your answer provides the units of measurement.

b. Suppose that this economy is currently producing at point B. What is the opportunity cost of producing one additional ladder given this information? Explain your answer. Make sure your answer provides the units of measurement.

c. Suppose this economy is currently producing at point C. What is the opportunity cost of producing one additional bucket given this information? Explain your answer. Make sure your answer provides the units of measurement.

d. Suppose this economy is currently producing at point C. What is the opportunity cost of producing one additional ladder given this information? Explain your answer. Make sure your answer provides the units of measurement.

e. Suppose this economy is currently producing at point D. What is the opportunity cost of producing one additional bucket given this information? Explain your answer. Make sure your answer provides the units of measurement.

f. Suppose this economy is currently producing at point D. What is the opportunity cost of producing one additional ladder given this information? Explain your answer. Make sure your answer provides the units of measurement.

1. Given the above PPF, write the equation(s) for each segment of the PPF. Identify the relevant range or domain for each equation. Show your work and how you found these equations.

**Basic Supply and Demand:**

7. For each of the following scenarios describe whether the demand curve and/or the supply curve shifts as well as the direction of the shift(s). Assume that each market is initially in equilibrium and that each market adjusts to the scenario to find its new equilibrium.

|  |  |  |
| --- | --- | --- |
| **Scenario** | **Which Curve(s) Shift?** | **What is the direction of the shift(s)? Describe the shift as a shift to the left or a shift to the right** |
| In the market for new cars a hailstorm damages all the new cars in Iowa. The damage is so bad that none of these cars can be sold. |  |  |
| In the market for pizza researchers determine that pizza consumption is positively correlated with academic success. |  |  |
| In the market for cellphones a new phone is developed with a wider range of popular applications. |  |  |
| There is an economic boom and you are asked to evaluate the impact of this economic boom on the market for generic cereals. |  |  |
| The government decides to subsidize corn production. You are asked to evaluate the impact of this subsidy on the market for biofuels made from corn. |  |  |

8. For each of the following scenarios describe the impact of the described change on the equilibrium price and equilibrium quantity in the chosen market. Describe any shift or movement that occurs as well. Assume that each market is initially in equilibrium.

|  |  |  |
| --- | --- | --- |
| **Scenario** | **Impact on Equilibrium Price and Equilibrium Quantity**  | **Shifts and/or Movements** |
| In the market for soft drinks people decide that ingesting sugar is bad for their health. |  |  |
| In the market for soft drinks a study reports that consumption of soft drinks is a direct contributor to increased obesity; and, at the same time, the price of sweeteners used to produce soft drinks increase.  |  |  |
| In the market for gasoline there is an increase in the number of fuel efficient cars sold; and, at the same time, widespread was breaks out in the Middle East disrupting oil production. |  |  |
| In the market for college education, the number of students attending colleges increases and, at the same time, the government decides to provide subsidies to those institutions providing college educations.  |  |  |

9. Suppose that the price of bubble gum increases. This results in Suzy buying more candy bars and fewer sweet tarts. From this information and holding everything else constant, what do you know about Suzy’s view of candy bars and sweet tarts relative to bubble gum? Explain your answer fully using complete sentences. Strive for conciseness and clarity!

10. Analyze each of the following scenarios and provide a graph to illustrate your answer. Use (Qo, Po) to designate the initial equilibrium price and quantity, and (Q', P') to designate the new equilibrium price and quantity. Illustrate in your graph any shifts that occur in the demand and/or supply curves.

a. Consider the market for coffee mugs that is initially in equilibrium. Suppose that the price of coffee decreases. Analyze the impact of this change on the equilibrium price and quantity of coffee mugs. Use a graph to illustrate your answer.

b. Return to the coffee mug market that is initially in equilibrium. Suppose that the price of coffee decreases while at the same time, clay, an input in coffee mugs, has a price increase. Analyze the impact of this change on the equilibrium price and quantity of coffee mugs. Use a graph to illustrate your answer.

c. Consider the market for televisions that is initially in equilibrium. New technology makes it possible to view visual content not only on televisions, but also on smart phones, laptops, and a variety of other types of smart devices. Given these developments what do you predict is going to happen to the equilibrium price and quantity of televisions? Use a graph to illustrate your answer.

d. Consider the market for traditional cars: that is, gasoline-powered cars. Younger Americans are choosing to live in more urban locations; take advantage of car services like Uber, Lyfe, and Zipcar; and even, in some cases, choosing to not get a driver's license (and maybe not even bother to learn to drive). At the same time, Google and Uber are pioneering new technology that will replace gasoline-powered and human-driven cars with driverless, electric cars. Given these changes, what do you predict will happen to the equilibrium price and equilibrium quantity of gasoline-powered cars over the next two decades (think about this in a longer time frame than just what is happening in this twenty-four hour period of time)? Use a graph to illustrate your answer.

e. Consider the market for ice cream that is initially in equilibrium. Suppose that people's income increase and that you know that the income elasticity of demand for ice cream is .5. This means that with every 1% increase in income, the quantity of ice cream demanded will increase by 0.5%. From this information, analyze what happens to the equilibrium price and equilibrium quantity of ice cream. Illustrate your answer with a graph.