Economics 390

Fall 2019

Homework #1

Due on Thursday, October 3, 2019

Homework is due at the beginning of lecture. The professor reserves the right to not accept homework if it is late. The expectation is that the homework will be done in a professional manner: it should be stapled, it should be neat, well organized, and complete. You cannot receive full credit if you omit questions and do not follow the provided instructions. There is no need to submit the questions: you need to simply submit your answers. You will not be able to get full credit for the homework if you do not show your work in an organized, easy-to-follow manner. Make sure your name is clearly and legibly written on the homework. Illegible answers will not get full credit.

1. In class we briefly discussed the idea of a free rider (we will return to this idea later in the semester). In a well-organized paragraph discuss an example of free riding from your own life experience. In your answer make sure you identify why your example illustrates this concept. Use complete sentences and standard English when writing your answer. Grammatically incorrect answers will result in a lower homework score.
2. We live in a world confronted with a large array of challenges. Identify one challenge in the world today that arises because of the existence of an externality that is not being corrected for by the market. Discuss what the challenge is, how it reflects the existence of an externality, the consequences of not addressing the externality and at least two possible solutions to the problem posed by the challenge you have selected. In your answer make sure you identify why your example illustrates this concept. Use complete sentences and standard English when writing your answer. Grammatically incorrect answers will result in a lower homework score.
3. For each of the following goods determine whether the good is rival or non-rival, and excludable or non-excludable. Fill in the provided table with your answer.

|  |  |  |
| --- | --- | --- |
| Good  | Rival or Non-Rival? | Excludable or Non-excludable? |
| Street Lights |  |  |
| Sewer Service for an individual in a community |  |  |
| Grazing your sheep on public land in your community that is made available to anyone who would like to graze their sheep |  |  |
| Lighthouses |  |  |
| A loaf of bread from your local bakery |  |  |
| Commercial fishing in a nation’s fishing grounds |  |  |
| McDonald’s Hamburger |  |  |
| National Defense |  |  |

1. Suppose you are charged with determining the optimal amount of pollution for a community. You are told that the marginal social cost (MSC) of pollution for the community can be expressed as a linear relationship over the relevant quantities of pollution. You are also told that the marginal social benefit (MSB) of pollution (this is a measure of the marginal cost abatement cost: that is, getting rid of pollution is not free) for the community can be expressed as a linear relationship over the relevant quantities of pollution. Here is some other data you have available:
	* When there are 10 tons of pollution per day, the marginal social cost of this level of pollution is $2000 per day.
	* When there are 20 tons of pollution per day, the marginal social cost of this level of pollution is $3000 per day.
	* When all pollution per day is eliminated, the marginal social benefit of this level of pollution is $10,000 per day.
	* When there are 100 tons of pollution per day, the marginal social benefit of this level of pollution is $0 per day.
	1. Given this information write an equation for the MSC for this community. For your equation use MSC as your y variable and the quantity of pollution (Q) as your x variable. Express your equation in slope-intercept form.
	2. Given this information write an equation for the MSB for this community. For your equation use MSB as your y variable and the quantity of pollution (Q) as your x variable. Express your equation in slope-intercept form.
	3. Given the equations you found in (a) and (b), determine the optimal amount of pollution for this community. Explain why the optimal amount of pollution is not likely to be zero tons of pollution.
2. Consider a perfectly competitive market that currently has ten identical firms serving the market. You are provided the following information:

Marginal Cost (MC) for each firm: MC = 10 + 4q

Total Cost (TC) for each firm: TC = 2q2 + 10q + 32

Market Demand: P = 100 – (1/2)Q

where q is the quantity produced by a firm, Q is the market quantity, and P is the price per unit for the good.

1. Given the above information and holding everything else constant, find the market supply curve. Explain how you found this curve. Write the market supply curve in y-intercept form. Assume that the market supply curve is linear.
2. Given the market curve you found in (a) and the provided information, determine the short-run equilibrium quantity and price in this market. Show how you found your answer in a well-ordered, logical explanation.
3. Given your answer in (b), now determine the quantity that a representative firm will produce in this market in the short-run. Make sure you show how you found your answer.
4. Given your answers in (b) and (c), now determine the short-run profit that a representative firm will earn in this market in the short-run. Make sure you show how you found your answer. What do you predict will happen in the long run in this market?
5. Assume that there are no changes to the market demand. From the provided information determine the long-run equilibrium quantity and price in this market. Remember that in the long-run all firms in the perfectly competitive market will earn zero economic profit. Make sure you show how you found your answer.
6. How many firms will be in this market in the long-run? Explain how you found your answer.
7. Given your answer in (f), find the long-run market supply curve. Assume that all firms are identical in this market and that the long-run market supply curve is linear. Write this equation in y-intercept form. Explain how you found your answer.
8. Calculate the long-run values for consumer surplus (CS), producer surplus (PS), and deadweight loss (DWL) in this perfectly competitive market. Show your work. You might find it helpful and time-saving to provide a graph that illustrates this market in long-run equilibrium with these areas marked.
9. Consider a monopoly that knows that the market demand for its product is given by the following equation where P is the price per unit and Q is the number of units of the good:

Market Demand: P = 200 – 2Q

Furthermore, the monopolist knows that its marginal cost curve (MC) is given by the equation:

MC = 50 + Q

* 1. Given this information determine the profit maximizing quantity, Q, for this firm if it acts as a single price monopolist. Then determine the monopolist’s price, P, for the good. Finally calculate the value of consumer surplus (CSmonopoly) for the monopoly, the value of producer surplus (PSmonopoly), and the value of the deadweight loss (DWLmonopoly) for the monopoly. Make sure you indicate how you found your answers to each of these values. You may find it very helpful to draw a graph of this monopolist in order to guide your work.
	2. Suppose that instead of acting as a single price monopolist, this monopoly produced the perfectly competitive quantity of the good and charge the price that would be charged if this market were a perfectly competitive market. That is, suppose this firm produces where demand equals supply. What is the equilibrium quantity under this assumption (Qperfectcompetition) and the equilibrium price under this assumption (Pperfectcompetition). Calculate the values for CSperfectcompetition, PSperfectcompetition, and DWLperfectcompetition. Make sure you indicate how you found your answers to each of these values. You might find it helpful to draw a graph of this monopolist acting as if this were a perfectly competitive market.
	3. Suppose this monopolist has the information and market power that allows the monopolist to practice first degree price discrimination (that is, perfect price discrimination, ppd). How many units of the good, Qppd, will the monopolist sell if the monopolist is a perfect price discriminator? What range of prices will the monopolist charge? Calculate the values of CSppd, PSppd, and DWLppd. Show how you found your answers.
	4. Suppose this monopolist decides to practice second degree price discrimination (2pd). The monopolist decides it will charge three different prices: $180, $140, and $120 per unit of the good. How many units of the good can the monopolist sell at each of these prices when the monopolist practices second degree price discrimination. Show how you calculated these quantities. Then calculate CS2pd, PSppd, and DWLppd. You might find it helpful to draw a graph to guide your work.
1. Consider a monopoly that knows that it sells its product to two different classes of buyers. The monopolist knows the following:

Demand for Class One: P = 20 – Q1

Demand for Class Two: P = 10 – (1/2)Q2

Marginal Cost of producing the good: MC = (3/11)Q

Fixed Cost of producing the good: FC = $10

Initially the firm has no way of determining whether a buyer is in Class One or Class Two. This is a long problem and the numbers are not going to be “nice”: on this problem feel free to use a calculator and to round to two places past the decimal for any answer you are calculating.

a. Suppose that this monopolist acts as a single price monopolist. Calculate the following based upon this assumption. Make sure you show how you found your answers!

Quantity the firm will choose to produce = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Price the firm will choose to charge = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Revenue for the firm = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Cost for the firm = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Profit for the firm = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Note: to fully answer this question you will need to investigate two different (Q, P) possibilities to determine which possibility yields the higher profit for the firm. A complete answer would provide both sets of numbers and then make the argument as to which (Q, P) the firm will select if they want to profit maximize as a single price monopolist.**

b. Now, suppose that the monopolist can readily distinguish between buyers in Class One and buyers in Class Two. The monopolist decides that they will practice third degree price discrimination (3pd). Given the above information determine the following. Make sure you show how you found your answers!

Quantity the firm will sell to Class One = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Price that Class One will pay = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Quantity the firm will sell to Class Two = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Price that Class Two will pay = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Revenue with third degree price discrimination = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Cost with third degree price discrimination = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Profit for the firm with third degree price discrimination = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_