Economics 390

Spring 2022

Homework #1

Due 2/10/2022

Homework is due by midnight Central Standard Time on its due date. Homework is to be submitted to the CANVAS course site: follow the directions for submission that are provided on the CANVAS page. 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 neat, well organized, and complete. You cannot receive full credit if you omit questions and do not follow the provided instructions. 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. Illegible answers will not get full credit.

**The Property of Rivalry and Excludability**

1. a. In lecture we discussed the property of excludability and the concept of free riding. In your own words define the property of excludability and the concept of free riding. Then write a brief statement about why non-excludability creates an environment that results in the free rider problem. Then, use apply your definition to examine the concept of “herd immunity”: how is herd immunity an example of free riding and the issues that arise from non-excludability. Can free ridership result in too little of the good being provided? Use herd immunity as your example to explore this issue. If you are uncertain what “herd immunity” is, then do some research on the concept before you start to develop your answer.

b. In lecture we discussed the property of excludability and the concept of free riding. In your own words define the property of excludability and the concept of free riding. Then write a brief statement about why non-excludability creates an environment that results in the free rider problem. Then, use apply your definition to examine the issue of voluntary vaccination. Can free ridership result in too little of the good, in this case, vaccinated individuals, being provided?

2. 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? |
| Ambulance sirens in a community |  |  |
| Public Radio Signal |  |  |
| Public Streets in a Community |  |  |
| Electrical Service for an individual in a community |  |  |
| Hamburgers from the Burger Shack |  |  |
| Grazing sheep on public lands |  |  |
| National Defense |  |  |
| A gallon of gasoline at the local gas station |  |  |
| A sandwich from a fast food restaurant |  |  |
| McDonald’s Hamburger |  |  |
| Public Health Measures like the slowing down of communicable diseases through the imposition of health mandates (like shelter at home or wearing masks) |  |  |

**Externalities**

3. 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.

4. Revisit your day today and identify three occasions when you saw or experienced an externality. Try to include both negative as well as positive externalities in your account. Be specific about the event and why it illustrates the ideas behind externalities.

**Equating Marginal Social Cost and Marginal Social Benefit**

5. 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 $500 per unit of pollution per day.
  + When there are 30 tons of pollution per day, the marginal social cost of this level of pollution is $1000 per unit of pollution per day.
  + When all pollution per day is eliminated, the marginal social benefit of this level of pollution is $2000 per unit of pollution per day.
  + When there are 10 tons of pollution per day, the marginal social benefit of this level of pollution is $1375 per unit of pollution per day.

a. 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.

b. 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.

c. 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.

6. 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 = 2 + 2q

Total Cost (TC) for each firm: TC = q2 + 2q + 36

Market Demand: P = 20 – (1/4)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.

a. 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.

b. 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.

c. 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.

d. 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?

e. 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.

f. How many firms will be in this market in the long-run? Explain how you found your answer.

g. 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.

h. 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.