ECON 360: Intermediate Microeconomics

Homework 5

- Define any variables you need to answer the problems.

- Use any materials to help you with these questions. That includes others in this course!

- Please write your answers in the space provided.

- Keep your answers short but clear. Your goal is to convince a skeptical grader that you understand the relevant concepts well enough to answer the question you are given.

- The questions on this homework sum to 78 points. But you get a 100 for completing/attempting the majority of the questions.

- Remember to write down the names of anyone you worked with on this homework!

- Bring any and all questions to office hours!

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1. (4 points) What is your name?

2. (4 points) Who did you work with on this homework?

1 True/False Questions

Indicate "T"rue or "F"alse for each of the following statements or claims. For each false statement, if you explain why it is false I will give you a bonus point.

3. (2 points) A firm's cost function is given by $c(q) = 10q^3 + 4q + 100$. **Claim**: This is a long-run cost function.

4. (2 points) The firm in question 3 figures out their profit maximizing quantity is 3. After hiring their capital and labor, the variable cost of production is 282. **Claim**: The firm's choice of capital and labor is consistent with maximizing behavior as we have learned in class.

5. (2 points) Suppose all gas consumed in the United States was produced in foreign countries, and so gas was purely an import. Also assume that the demand for gasoline is perfectly inelastic. Now suppose the US government places a tax on imported gas, or a tariff. **Claim**: According to what we have learned in class, the price of gasoline would increase by the same amount as the tariff.

6. (2 points) **Claim**:In the short run, marginal revenue being lower than marginal cost always results in a short run profit maximizing quantity of zero.

7. (2 points) A firm that solves its profit maximization problem has therefore also solved its cost minimization problem.

2 Multiple Choice Questions

Circle the best answer to each question. There is only one answer for each question. No explanation necessary.

8. (2 points) Which of the following is false?

   A. Average fixed costs never increase with output.

   B. Average total costs are always greater than or equal to average variable costs.

   C. Average cost can never rise while marginal costs are declining.

   D. None, all the statements are true.

9. (2 points) Suppose a firm faces fixed costs of $100. The wage is $5/worker, and the rental rate is $10/machine. The firm has figured out that for any given amount of output q their profit maximizing amount of labor is $3q$ and their profit maximizing amount of capital is $2q$. Which option represents the firm's average variable cost function?

   A. 25

   B. 25q

   C. 25q+100

   D. $25 + \frac{100}{q}$

10. (2 points) Suppose that market demand for eggs in a neighborhood is given by the equation $Q^D = 24 - 12p$. The neighborhood has 4 households which produce eggs. Each egg producing household has a supply curve $Q^S = 3p$. Assume that the households cannot set the price of eggs and so take the market price as given. What is the equilibrium price and quantity of eggs in the neighborhood?

   A. Q=4.8, P=1.60.

   B. Q=12, P=1.6.

   C. Q=4.8, P=1.

   D. Q=12, P=1.

11. (2 points) Using the information in the question above, now suppose each firm has a total cost or producing y eggs given by $c(y) = 3y + 40$. How would the number of egg producers in the neighborhood change in the long run based on what we have learned in class?

   A. The number of egg producers would increase.

   B. The number of egg producers would decrease.

   C. The number of egg producers would remain constant.

D. We need more information.

12. (2 points) Demand for gourmet coffee is given by $Q^D = 100 - P$ and supply is given by $Q^S = 4P$. Suppose the government wants to reduce the amount of gourmet coffee consumed and so adds a \$5 per unit tax to each coffee sold. Calculate the deadweight loss due to the tax.

    A. \$0

    B. \$20

    C. \$10

    D. We need more information.

3 Short Answer Questions

These questions all require an explanation. Remember you are trying to convince me you understand the why and the how of what you are doing, not simply getting the answer correct. Cite specific concepts from class in your answers for full credit.

13. **Tariffs & International Trade**. Suppose you are asked to predict the impacts of a new tariff on steel on domestic consumers and producers. A tariff is a tax added to each ton of imported steel. You have figured out that domestic demand for steel is given by $Q^D(P) = 1500 - 10P$. Suppose that all steel manufacturers are identical and so have total costs to produce q tons of steel given by $C(q) = q^2 + 30q + 100$. Suppose the steel industry is perfectly competitive.

   (a) (4 points) Find each firm's average total cost curve and marginal cost curve. Show your work.

   (b) (10 points) Find each firm's long-run profit maximizing quantity q^*, the price in the market and long-run equilibrium total quantity supplied in the marked Q^*. How many firms are in the market in the long-run equilibrium? Show your work.

(c) (6 points) Derive the industry supply curve based on your answer to part b.

(d) (6 points) Draw a supply and demand diagram using the aggregate demand and

supply curves. Show the equilibrium price and quantity on your diagram.

(e) (3 points) Suppose that the world price of steel is the same as the equilibrium price you found in part c. How much steel would this country import?

(f) (4 points) Suppose instead the world price was $40 per ton of steel. On your supply-demand graph, show this new world price line and show the amount of steel this country would export or import. Explain.

(g) (2 points) Suppose instead the world price was \$60 per ton of steel. How would your answer to part g change? A graph is optional a verbal explanation is sufficient.

(h) (3 points) Suppose the goal of the tariff is to make the country's steel trade deficit exactly equal to 0 when the world price of steel is $40. That is to say the country does not export or import any steel. How much would that tariff be?

(i) (12 points) On a new supply and demand diagram, again show the aggregate demand and aggregate supply curves and world price line of $40. Now show the tariff on the graph. Using the graph, explain the benefits and costs of the tariff on the country and provide guidance as to whether or not you think the tariff should be implemented based on the principles of welfare we have learned in class.