Economics 11  Caltech Spring 2010

Practice final

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Following the Honor code, you should find 180 minutes and to do this test, by yourself and without using any notes. If you go over time that is ok. Paper and pen should be all you need. Turn it by Tuesday June 8 3pm Baxter 133. This exam is worth 100 out of 200 possible pts)

EXAMS IN PENCIL WILL NOT BE REGRADED.

The exam is composed of a section (1) on the second half of the class (40pt) and a cumulative section (60pt)
Section I last half of Class

I Definitions (use words not equations)

1.A. 2pt Please define: Tragedy of the commons

1.B. 2pt Please define: Natural Monopoly

1.C. 2pt Please explain: Comparative advantage?

1.D. 2pt Please explain: Certainty equivalent to a risky bet?

1.E. 2pt Please explain: Free Entry and exit?
Word/Graph problems

2.a. 4pts: Please explain each question in a few sentences.

- One firm has located in the western portion of a town. The single-family residences take up the eastern portion. The firm emits noxious fumes as part of its production. The more fumes the more plants in the residents’ gardens die. Sketch a diagram that details the marginal cost of pollution abatement and the marginal benefit of pollution abatement. On the basis of that graph can you decide what the efficient level of pollution might be? Can you also use the graph to show how it matters whether the firm or the residents decide on air quality?

2.b. 4pts True or False: Please explain each question in a few sentences.

- Suppose corn farmers in the US can be represented by a competitive industry with no economies or diseconomies of scale. Describe how this industry would adjust to an increase in demand for corn. Explain your answer graphically; showing the cost curves for the typical farmer as well as the market supply and demand curves for short run and long run.

2.c. 4pts Please explain each question in a few sentences.

- Indicate whether each of these sentences is true or false, briefly justifying your answer with a graph.
  a) A monopolist operating in two markets and facing the same production costs to serve both of them must charge a higher price in the market with higher price-elasticity.

2.d. 4pts Please explain each question in a few sentences.

- A computer programmer lobbies against copyrighting software. He argues that everyone should benefit from innovative programs written for personal computers, and that exposure to a wide variety of computer programs will inspire young programmers to create even more innovative programs. Considering the marginal social benefits possibly gained by his proposal, do you agree with the programmer’s position? Explain
3. **Technical problems**

3.a 6 pts

Suppose there are two types of cars, good or bad with a market share $p$ and $1-p$ in the market. Sellers won’t sell the good cars lower than $1800$ and bad cars lower than $800$. Analogously, buyers won’t pay higher than $2000$ for the good cars and $1000$ for bad cars.

- If the quality of the cars were observed, what would be the trading price for good car and the trading price for bad cars?
- If the quality is unobserved by buyers what would be the price buyers would pay as a function of $p$ (the likelihood the car is good)?
- At what fraction of good cars in the population of cars does the lemon’s problem arise?

3.b 8 pts

Assume that a monopolist with total cost function $c(q) = q^2 + 100q$ faces a market demand curve given by: $q^d = 700 - p$.

a) What would be the production level if the firm takes prices as given?
b) Obtain the optimal production level, price, and profit level for the monopolist.
c) Suppose that the government establishes a fixed tax of 10,000 dollars. How does this tax scheme affect the production and profit levels of the monopolist?
d) Suppose now that, instead of a fixed tax, the government now establishes a 20 dollar tax per unit sold of the good. How would this tax affect the production and profit levels of the monopolist?
Section II Cumulative
II.1 Definitions (use words not equations) 4 lines or less

II.1.A. 2pt Why are market allocations efficient for private goods.

II.1.B. 2pt Please define: consumer surplus

II.1.C. 2pt Please explain: why might taxes be necessary for the efficient provision of public goods

II.1.D. 2pt Please explain: What was the value of trade for David Ricardo

II.1.E. 2pt Please explain: total factor productivity

II.1.F. 2pt Please explain: pure private property
II.2 Word/Graph problems
II.2.a. 4pts: Please explain each question in a few sentences.

- Elasticity
  - Explain why gas is inelastic on the short term and elastic on the long term.
  - Describe and explain the long term and short term elasticity of luxury goods (e.g. designer purses, clothing, cars)

II.2.b. 4pts True or False: Please explain each question in a few sentences.

- Two countries sign a free trade treaty are the gains to trade more likely to be bigger for small or large countries? Why?

II.2.c. 4pts Please explain each question in a few sentences.

A firm faces an investment opportunity with a social return \( R(k) \) that is concave in \( k \). it private return is \( \alpha R(k) \). How is it like to decide how much to invest? Why is that socially inefficient? Suggest a policy that might induce the firm to increase its investment.
II.3. Technical problems

II.3 8 pts
1. Anna spends all of her income on shirts $S$ and jeans $J$. Anna’s preferences can be represented by the utility function $U(S,J) = 3SJ^{0.5}$
   
   4 pts Derive the demand functions for shirts and jeans in terms of the price of shirts $P_S$, the price of jeans $P_J$, and income $I$.

   2 pts Suppose the price of a shirt is $4, the price of a pair of jeans is $16, and Anna has $128 income. What bundle of shirts and jeans $(S, J)$ maximizes Anna’s utility?

   2 pts Suppose the price of a shirt increases to $16. What bundle of shirts and jeans will Anna demand now?

II.3.b 12 pts
- Assume a monopolist sells the same good in two different markets. The aggregate demand in market 1 is $q_1^d = 200 - p_1$, while for market 2, the aggregate demand is $q_2^d = 50 - \frac{1}{2}p_2$. The marginal cost of production for the monopolist is constant and equal to 40.

   2 pts What would be the competitive equilibrium in these markets, what would be consumer surplus?

   4 pts Assume the firm can charge a different price each market. What would be the prevailing prices and quantities transacted in each market?

   4 pts Now suppose that the government precludes the monopolist from charging different prices in the two markets. What price would the firm - acting as a monopolist - then charge in the “unified” market?

   2 pts Which solution has the lowest deadweight loss?

II.3.c 10 pts
2. Assume that a firm’s production function is given by $Y = f(K,L) = 6K^{1/3}L^{2/3}$

   2 pts a) Derive the expression for the marginal rate of technical substitution (MRTS) for this production function.

   4 pts b) Let the wage rate $w$ be $4 and the rental rate of capital $r$ be $16. Assuming that the firm is producing 54 units of output, what will be the cost-minimizing combination of labor and capital used by the firm?

   2 pts c What will be the firm’s total cost of producing 54 units of output?
2pt  d) Derive the expressions for the short-run average cost of production. Does the firm have decreasing returns to scale?

II.3. d 6 pts
Suppose that 10 persons live on a street and that each of them is willing to pay $2 for each extra streetlight, regardless of the number of streetlights provided up to 50 streetlights. If the cost of providing streetlights is given by $c(x)=x^{0.5}$,
2pts what is the private equilibrium number of streetlights?
4pt what is the Pareto efficient number of streetlights to provide?