Econ301a: Advanced Microeconomics
Fall 2008
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Final Exam

Directions: Do all problems. 100 points total. Stay calm and good luck.

I. True, False, Uncertain (Explain) (10 points each)

1. A profit maximizing monopolist will never operate along the portion of its demand curve for which price elasticity is greater than one.

   FALSE

$$TR = p(q)q$$

$$MR = \frac{\partial p}{\partial q}q + p$$

$$MR = p(\frac{1}{\epsilon} + 1)$$

   If $MC > 0$, then $MR > 0$, and therefore, $\epsilon < -1$. Never will see $|\epsilon| < 1$.

2. In a two good production function $Y = f(K, L)$, if the average product of labor is at its maximum, then it must equal its marginal product.

   TRUE

$$\frac{Y}{L} = \frac{f(K, L)}{L}$$

   FOC for average product of labor.

$$0 = \frac{f_L(K, L)}{L} - \frac{f(K, L)}{L^2}$$

$$0 = (1/L)(f_L(K, L) - \frac{f(K, L)}{L})$$

3. A firm uses 10 units of labor and 20 units of capital to produce 10 units of output. The marginal product of labor is 0.5. If there are constant returns returns to scale the marginal product of capital must be 0.25.

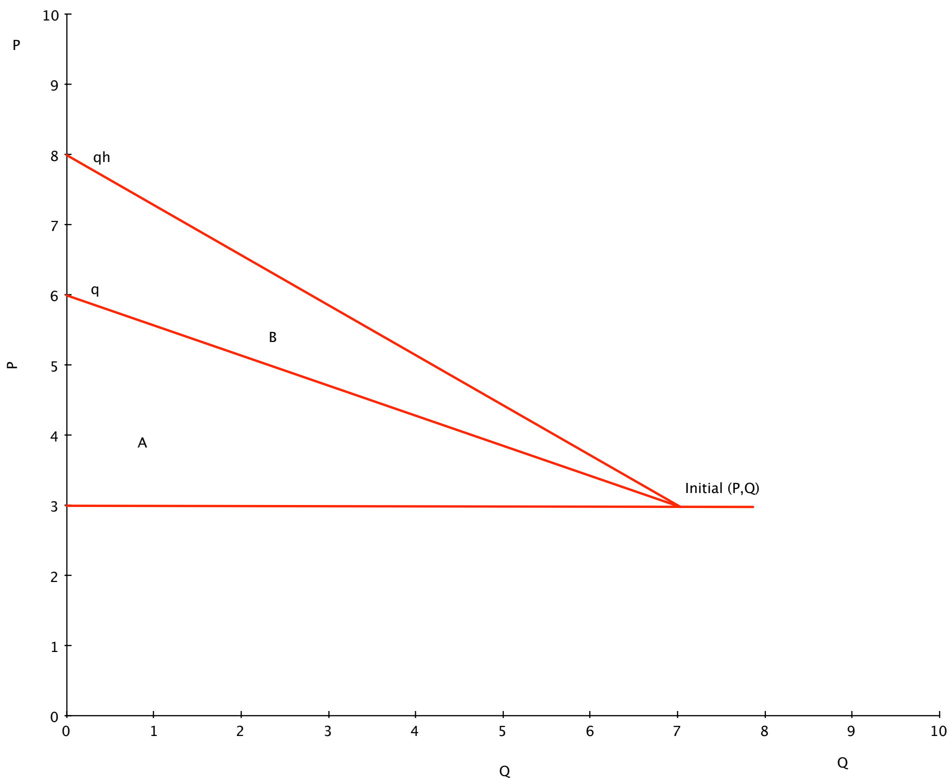
   TRUE

$$Y = f_K K + f_L L$$

$$10 = f_K 20 + 0.5 * 10$$

   Solve to find that $f_K = 0.25$,

4. If a good is normal, then the consumer surplus is an over estimate of the monetary sum that the consumer would need to be compensated for banning the purchase of that good completely.



The good is normal so q will be flatter than qh (bigger reduction in demand w/o compensation). A+B Is the CV loss, and is larger than A which is the consumer surplus loss.

II. Longer questions

1. (10 points) A factor of production is called inferior if the conditional demand for that factor decreases as output increases,

$$\frac{\partial x_i(w,y)}{\partial y} < 0$$

   (a) Show that if the production technology is constant returns to scale then no factor can be inferior.
   From constant returns to scale,

$$C(w,y) = g(w)y$$

$$\frac{\partial^2 C(w,y)}{\partial w_i \partial y} = \frac{\partial x_i}{\partial y} = \frac{\partial g}{\partial w_i}$$

   Since the cost function must be non decreasing in w_i, the above must be ≥ 0, and the factor is not inferior.

   (b) Show that if marginal cost decreases as the the price of some factor increases then that factor must be inferior.

$$\frac{\partial^2 C(w,y)}{\partial w_i \partial y} = \frac{\partial x_i}{\partial y} = \frac{\partial MC}{\partial w_i}$$

   Obviously, for CRS technology this can't be negative, from part (a).

2. (15 points) A given unregulated cable TV market has two firms. Demand for TV (whatever this means) is give by,

$$p = 20 - q$$

$$q = \sum_{i=1}^{2} q_i$$

The total cost function for each firm is given by,

$$c(q_i) = 10 + 8q_i$$

Firms operate only if they can earn positive profits.

(a) Find a symmetric (all firms the same) Cournot/Nash equilibrium for these two firms in this market. What is the total quantity and price of TV in this situation? What are the profits for the two firms?

$$MC_i = 8$$

$$TR_1 = (20 - q_1 - q_2)q)q_1$$

$$MR_1 = 20 - 2q_1 - q_2 = 8$$

Solving gives, $q_1 = q_2 = 4, p = 12$.

(b) What is the total consumer surplus in this case?

From the demand curve. At p = 20, demand = 0. Price goes to 12, and q = 8, so CS = (1/2)8*8 = 32.

(c) Now a third identical firm is thinking of entering the market. It assumes that if and when it comes in, the market will be in a symmetric Cournot/Nash equilibrium (now with 3 players). What would be the price and output in this situation? Will this firm enter?

$$TR_1 = (20 - q_1 - q_2 - q_3)q)q_1$$

$$MR_1 = 20 - 2q_1 - q_2 - q_3 = 8$$

Solving these gives, $q_1 = q_2 = q_3 = 3, p = 20 - 9 = 11$.

Profits $= 11 * 3 - 10 - 24 < 0$ Will not enter.

(d) Now the government is going to give a special infrastructure subsidy to all firms only if they operate. This subsidy would be fixed at 2. Will the third firm chose to enter, and if it does what will be the profits for the three firms, and the total consumer surplus?

Profits $= 11 * 3 - 10 - 24 + 2 = 1 > 0$ Will enter.

Consumer surplus goes to 9(20-11)/2.

(e) What is the net cost/benefit of this policy in terms of the change in consumer and producer surplus versus the total cost of the policy for the government?

Change in profits for firms, 12-¿3 = -9.

Change in CS, 81/2-32 = 17/2

Change in G -3

Total = ¡0 loss,

3. (15 points) *We can't do this problem at this point.* An airport is located next to a large tract of land owned by a housing developer. The developer would like to build houses on this land. The more planes that fly, the lower is the amount of profits that the developer makes. Let x be the number of planes flying per day. y is the number of houses. The profits of the airport are given by,

$$\pi_A = 48x - x^2$$

and the developer's profits are

$$\pi_D = 60y - y^2 - xy$$

This question asks about the outcome in different institutional arrangements.

(a) No bargaining. The airport optimizes, and the developer lives with it, and optimizes given the airport's decision. What are the profits for the two?

(b) The airport is banned in a local ordinance $x = 0$, and the developer operates to maximize profits.

(c) Assume we are in the situation from part one. The developer attempts to cut a deal with the airport. Assume that (x^*, y^*) are the solution from the first part. The developer gets a commitment from the airport to cut back flights to $\bar{x}$, under the arrangement that they will compensate for any losses incurred in moving from x^*. How does this outcome compare to the first part in terms of profits of the airport and the developer.

(d) Compare this solution to the situation where the airport and the development are owned by the same firm (maximizing total profits). How is this related to the Coase theorem?

4. (10 points) Assume preferences follow all the standard axioms, but not necessarily monotonicity. The Walrasian auctioneer calls out price vectors. Which of the following are possible situations given that agents are maximizing utility subject to their budget constraint, $p \cdot x \leq p \cdot w$?

This weaker version of Walras leads to $p \cdot z(p) \leq 0$.

(a) All prices are strictly positive. Excess demand in all markets is zero, but is strictly positive in one market.

This can't hold since this would drive the above sum to be negative.

(b) All prices are strictly positive. One or more markets have a negative excess demand, and all other markets have excess demand equal to zero.

Since $p \cdot z(p) \leq 0$ this is possible.

(c) All prices are strictly positive. Several markets have positive excess demand, and only one has negative excess demand.

This is also ok, by the new looser version of Walras law.

5. (10 points) In class we discussed some of the philosophical side of general equilibrium. Especially its underpinning for invisible hand thinking, and feelings about the ability of free markets to allocate resources efficiently. Describe one of the problems that we mentioned that might make one less confident in general equilibrium as a metaphor for an efficient allocation mechanism.

See comments at end of last lecture.

(a) Existence of auctioneer, decentralization ??

(b) Problems in dynamics of getting to convergence

(c) Weak predictions about outcomes

(d) Missing markets, externalities, public goods