Final Exam

AEC 504 - Summer 2007

Fundamentals of Economics

1 Veni, vidi, vici (30 points)

Two firms with constant marginal costs serve two markets for two different goods. The demand function for good 1 is $Q_1 = 20 - p_1 + 0.5p_2$, where p_1 and p_2 are the prices of good 1 and good 2, respectively. The demand function for good 2 is $Q_2 = 25 + p_1 - p_2$.

To answer this problem, you need not perform any calculations. (You certainly may if you want, but the answers have to contain economic intuition).

i. *(5 points)* Are those two goods substitutes or complements?

ii. *(10 points)* Suppose that we start from the competitive outcome. Will the firms want to collude? What will happen to the prices if the firms collude?

Hint: Think about the externalities that firm 1 creates for firm 2 if firm 1, say, increases the price of its product.

iii. *(10 points)* How would your answer to (ii) change if the demand functions were $Q_1 = 20 - p_1 - p_2$ and $Q_2 = 25 - p_1 - p_2$?

iv. *(5 points)* Suppose the demand functions change to $Q_1 = 20 - p_1$ and $Q_2 = 25 - p_2$. Will the firms want to collude?

2 Hard Love (25 points)

Sugar Kowalczyk enjoys money, M, and saxophone music, S. Her utility function is $U = S^2 + M$ and her budget constraint is $pS + M = I$.

i. *(15 points)* Derive Sugar's demand for saxophone music and money. Is the law of demand satisfied for Sugar's demand for saxophone music? What is the economic intuition behind your answer? What change, if any, should be made in the utility function to make the consumer behave in line with the law of demand?

ii. *(10 points)* Is Sugar risk-averse with respect to random fluctuations in income? What about fluctuations in the price of music?

Hint: Find the indirect utility function, i.e. express Sugar's utility in terms of her income and the price of music. Then determine if Sugar is risk-averse with respect to fluctuations in I treating p as a constant, and vice versa, that is, would she rather take a fixed income (price) or a gamble with the same mathematical expectation.

3 A Standard Monopoly Problem (35 points)

Consider a monopoly which faces the demand curve $P = 150 - 2Q$ and has *MC=30*. Assume *FC=0*.

i. *(5 points)* What is the optimal quantity for the monopoly? What profit does it make at this quantity?

ii. *(5 points)* What is the point elasticity of demand at the optimal quantity? What is the markup (defined as $\frac{P - MC}{P}$) at the optimal quantity? What is the relation between the two?

iii. *(10 points)* Assuming your answer to (ii) is true in general, will a monopoly ever produce on the inelastic portion of its demand curve? To get full credit, provide a rigorous proof that it will or will not.

iv. *(5 points)* What would be the competitive long-run outcome?

v. *(10 points)* What is the gain/loss to the society from switching to the competitive outcome?

4 Monopoly and Entry Prevention (65 points)

Consider a firm that faces the demand curve $P = 150 - Q$ and has $MC = \$20$.

i. *(5 points)* If the firm is a monopoly, what is its optimal price and quantity? What is the profit?

ii. *(10 points)* Suppose another firm enters the industry and the two firms compete a-la Cournot. The entrant has $MC = \$40$ and has to pay \$500 to enter the industry. Compute the optimal quantity for the entrant and the incumbent, their profits and the price.

iii. *(10 points)* Suppose the incumbent can credibly commit to producing and selling 80 units of the good. Will the entrant still want to enter? Will the incumbent want to commit to selling 80 units of the good?

iv. *(15 points)* Suppose the incumbent still commits to produce 80 units, but the entrant does not have to pay anything to enter. Will it enter? What will its quantity choice be? Are the quantity choices of the entrant and the incumbent a Nash equilibrium in the Cournot game?

v. *(25 points)* Suppose the entrant pays nothing to enter and offers to form a cartel. The cartel is supported by the usual trigger strategy with the threat to revert to the Cournot equilibrium forever. Will the cartel be sustainable if they divide the monopoly profit 50-50? What if they divide it 70-30 in favor of the incumbent? What is the maximum and the minimum amount of money the incumbent can receive as a cartel member so that the cartel is sustainable? Assume that the firms use the discount rate of 15% to compute the present value of the future profits.

Hint: Remember that if the cartel is sustainable, nobody wants to deviate.

5 Two-Part Tariff (25 points)

Consider a firm with *MC=AC=1* trading with two buyers, whose demand functions are $Q_1 = 5 - 2p_1$ and $Q_2 = 7 - 3p_2$. The firm can distinguish the buyers.

i. *(5 points)* What is the optimal price-discrimination strategy?

ii. *(15 points)* Determine the optimal two-part tariff for each buyer. Compare the sales and social welfare under the two-part tariffs with those in (i).

iii. *(5 points)* Suppose firm cannot distinguish buyers, but still wants to use the two-part tariff. What will be the common two-part tariff the firm will offer to both buyers?