0 → 5,5
3 → 3,3

HUL212 - MICROECONOMICS

MAJOR EXAMINATION (**May 03, 2015**), IITD Sem II, AY 2014-15,

Time Allowed: 2 Hours. (ANSWER ALL, Full marks=40)

Q1 (Quiz - True/False type; give explanations whenever needed) [$10 * 1 = 10$ **marks**].

(i) If the value of the marginal product of labor exceeds the wage rate, then a competitive, profit-maximizing firm would want to hire less labour.

(ii) If the price of the output of a profit-maximizing, competitive firm rises and all other prices stay constant, then the firm's output cannot fall.

(iii) If there are increasing returns to scale, then average costs are a decreasing function of output.

(iv) A price-discriminating monopolist charges p_1 in market 1 and p_2 in market 2. If $p1 > p2$, the absolute value of the price elasticity in market 1 at price p_1 must be smaller than the absolute value of the price elasticity in market 2 at price p_2.

(v) It is possible that a profit-maximizing monopolist who is able to practice first-degree (perfect) price discrimination would sell a quantity x such that the demand curve for his product is inelastic when the quantity sold is x.

(vi) A Stackelberg leader will necessarily make at least as much profit as he would if he acted as a Cournot oligopolist.

(vii) In a Nash equilibrium, everyone must be playing a dominant strategy.

(viii) A general has the two possible pure strategies, sending all of his troops by land or sending all of his troops by sea. An example of a mixed strategy is where he sends $\frac{1}{4}$ of his troops by land and $\frac{3}{4}$ of his troops by sea.

(ix) In Bertrand competition between two firms, each firm believes that if it changes its output, the rival firm will change its output by the same amount.

(x) Conjectural variation refers to the fact that in a single market there is variation among firms in their estimates of the demand function in future periods.

Q2 [10 points] . On a street of length L miles, two ice cream vendors are selling identical brand of ice creame. Two sellers are located at two extreme points of the street and their location is fixed. There are N consumers uniformly distributed along this street. Each consumer buys exactly one ice-creame and all consumers faces the same roundtrip transportation cost equal to αd where d is the one-way distance (thus if the consumer lives at point A and goes to point B which is d miles away from A, then the transportation cost for the entire roundtrip from A to B and back to A is αd). Net utility of a consumer i who buys a ice creame from vendor k ($k = 1, 2$) is given by

$$U_i = V - p_k - (transport\ cost)$$

where V is some constant and p_k is the price charged by vendor k ($k = 1, 2$). Consumers chooses vendor to maximize their net utility. The two vendors have the same cost function given by $C(q) = cq$ where c is some constant. Assume that: $L = 8, N = 480, \alpha = 3, c = 1$.

$d_{11} < 4 + \frac{p_2 - p_1}{6}$

$d_{11} < 4\left(\frac{p_2 - p_1}{3}\right)$ U_{11} $V - p_{1} - 3d_{11}$ $p_2 + 3d_{12} > p_1$

$(p_2 - p_1) > 3($

$x_1 p_{x_1+x_2} - Cx_1$

$x_2 p_{x_1+x_2} - Cx_2$

(a) [4 points] Find the demand functions for the two vendors.

(b) [4 points] Find the Nash equilibrium in prices. Calculate the equilibrium profit of each seller.

(c) [2 points] If both firms had been located in the same spot, namely in the center of the street, what would the equilibrium prices have been?

$(a-c) - b(y_1+y_2+y_3)y_1$

Q3 [10 points] . There are three firms in a homogeneous-product industry, where inverse demand is given by $P = a - bQ$ ($a > 0, b > 0$, Q = total industry output). All firms have the same cost function given by $C(x) = F + cx$ (where $F \geq 0$ is fixed cost, $c > 0$ is marginal cost, with $c < a$, and x is output). Firms compete in output levels.

$(a-bQ)Q - (F+cQ)$

(a) [4 points] Calculate the Cournot-Nash equilibrium.

The owners of firms 1 and 2 meet to discuss the possibility of merging the two firms into a single firm that would have the same cost function, namely $C(x) = F + cx$. If they decide to merge, they will each have 50% of the shares of the new firm.

$(a-c) = b(2y_1+y_2+y_3)$

(b) [5 points] Assume that $F = 0$ (no fixed costs). Should they merge?

(c) [1 point] Assume now that $F > 0$. Does your answer to question (b) change?

Q4 [10 points] . There are three players. Each player is given an unmarked envelope and asked to put in it either nothing or \$3 of his own money. A referee collects the envelopes, opens them, gathers all the money and then doubles the amount (using his own money) and divides the total into three equal parts which he then distributes to the players. For example, if players 1 and 2 put nothing and player 3 puts \$3, then the referee adds another \$3 so that the total becomes \$6, divides this sum into three equal parts and gives \$2 to each player.

480 240

(a)[4 points] Represent this situation as a normal-form game assuming that each player only cares about how much money she herself ends up with (that is, what she gets minus her contribution) and prefers more money to less.

(b) [2 points] Now represent the above situation as a normal-form game still assuming that player 2 only cares about how much money she herself ends up with (that is, what she gets minus her contribution) and prefers more money to less. On the other hand, players 1 and 3 have a common bank account from which they draw their individual contributions and into which they pay what they receive at the end. Thus they only care about the final balance of their joint account and prefer a higher balance to a lower one.

(c)[1 point] In the game of part (a), for each player determine if that player has a weakly or strictly dominant strategy (specify if it is strict or weak dominance).

(d)[1 point] In the game of part (a) find all the pure-strategy Nash equilibria.

(e)[1 point] In the game of part (b), for each player determine if that player has a weakly or strictly dominant strategy (specify if it is strict or weak dominance).

(f)[1 point] In the game of part (b) find all the pure-strategy Nash equilibria.

THE END

$(a-c)y_1 - b(y_1^2 + y_1y_2 + \ldots)$

$(240+10p_1) - 10p_2 - 12 + \left(\frac{p_3}{2}\right)$, $12 + \left(\frac{p_2-1}{2}\right)$

$\frac{(240+10p_2-10c)y_1 - y_1^2}{10}$

$p_1 \; \frac{(240+10p_2) - y_1}{10}$ $\quad p_1 y_1 - cy_1$

$\boxed{12 + \left(\frac{p_2-1}{2}\right) = y_1}$ $\quad \frac{(240+10p_2)y_1 - y_1^2}{10} - cy_1$ $\quad \frac{240+10p_2-10c}{10} = 2y_1$

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