QUIZ 2

Economics 476

November 16, 2017

Total points: 50

1. [10 points] Consider the following chart of 2 separate industries:

% share	s_1	s_2	s_3	s_4	s_5	s_6	s_7	s_8	s_9	s_{10}	I_4	I_{HH}
Industry 1	34	17	x	11	10	8	5	2	0	0	75	
Industry 2	39	25	y	10	9	4	0	0	0	0		2464

   (a) What is the value of x?

   (b) What is the value of y?

   (c) There are 8 firms that supply premium unleaded gasoline in Provo, Utah: Sinclair, Sam's Club, 7-Eleven, Shell, Maverick, Phillips 66, Chevron, and Smith's. The market shares are as follows: 3, 25, 8, 8, 20, 8, 20, and 8, respectively. What is the 4-firm concentration ratio (I_4)? What is the Herfindahl-Hirshman index (I_{HH})?

2. [25 points] Consider a market for pizza (denoted s) which includes the dough and the toppings. Let the dough (denoted x) and the toppings (denoted y) be perfect compliments such that $x = y = Q$ (i.e. every pizza sold includes dough and toppings). The price of the pizza is $p_s = p_x + p_y$. Let demand for pizzas be $Q = a - p_s$. Assume firm X produces the dough and firm Y produces the toppings and they compete on price for their differentiated good (Bertrand). Let marginal cost be c_x and c_y, respectively.

(a) Formulate the profit function for firm X and firm Y (i.e. π_x and π_y).

(b) Calculate the the optimal prices (i.e. p_x^* and p_y^*). What is the full price, p_s^*, of a pizza?

(c) What are the profits for each firm (i.e. π_x^* and π_y^*)?

(d) Now suppose that firm X and firm Y merge. Assume that marginal cost for the monopolist is c_s. What is the profit function for the new monopoly?

(e) Solve for the monopolist price and profit (i.e. p_s^M and π^M).

(f) Let $a = 120$, $c_s = 20$, $c_x = 10$, and $c_y = 5$. What are the profits for firm X, firm Y, and the merged firm? Do industry profits increase or decrease after the merger?

3. [15 points] Consider two firms, AMD and Intel, who are separately investing in R&D to discover the process to allow the efficient production of microprocessors based on 7nm technology. AMD has a probability α of discovery in a particular period. Intel has a probability β of discovery in a particular period. Assume that each period T is one month. Also, assume that the probability of discovery by either firm is independent of one another.

   (a) What is probability that neither firm discovers in a particular period?

   (b) What is probability that AMD discovers, but Intel does not in a particular period?

   (c) What is probability that Intel discovers, but AMD does not in a particular period?

   (d) What is probability that both firms discover in a particular period?

   (e) What is the probability that at least one firm discovers in a particular period?

   (f) Let $1c + 2\omega c + 3\omega^2 c + \cdots = c \sum_{t=1}^{\infty} t\omega^{t-1} = \frac{c}{(1-\omega)^2}$. Using this hint, what is the expected date of discovery if both AMD and Intel separately invest in R&D? That is, what is $E_{amd,\,intel}(T)$?

Bonus: [2 points extra credit] Which topic are you most interested in covering (i.e. choose ONE)?

- Networks and compatibility
- Advertising
- Pricing tactics
- Marketing tactics
- Price dispersion and search theory
- Management and compensation
- Bargaining and auctions