

總分 30 分。答題皆須附說明, 未做解釋的答案概不計分。

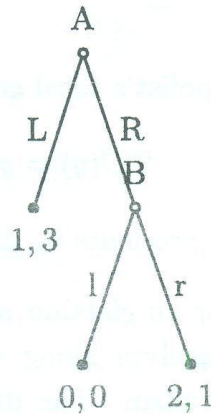
1. Consider the case that a digital camera manufacturer monopolizes the market. There are two types of consumers who have different individual demand for memory cards:

$$D_h : q_m = 40 - 4p_m$$

$$D_l : q_m = 10 - p_m,$$

where p_m and q_m are the price and quantity of memory cards. The population of each type are 100. To simplify the analysis, we assume there is no production cost and the manufacturer wishes to maximize total revenue. Let p_c denote the price of a digital camera. In the following, we shall figure out the optimal p_c and p_m for the manufacturer.

- (a) (2 point) Suppose the sale is only aimed at consumers with high demand (D_h). What is the optimal p_c and p_m ?
- (b) (2 points) Now consider the case that prices are set to attract both types of consumers. The optimal price of a memory card is p_m^* in this case. What is the price of a camera (in terms of p_m^*)?
2. Manufacturer X monopolizes the market thanks to his patent. His production cost is zero. He offers the products at a unit price of p_w to three retailers who are engaged in Cournot competition. The market demand is: $q = 120 - p$, where p is the retail price and q is the quantity demanded. (Note: Let q_i denote retailer i 's sales. In equilibrium, given $q_j, j \neq i$, q_i will maximize retailer i 's profit.)
- (a) (2 points) What is the retail price in equilibrium? (The answer is a function of p_w .)
- (b) (2 point) X now considers to charge a fixed fee, F , to each retailer, in addition to the unit wholesale price p_w . Please calculate the optimal F and p_w that maximize X's revenue.
3. In the following game, the 1st (2nd) element in a payoff vector specifies A's (B's) payoff.



- (a) (2 points) Please find the subgame perfect equilibrium.
 - (b) (2 points) Please give the strategic form (normal form) of the game.
 - (c) (4 points) Please find all Nash equilibria.
4. (4 points) In an industry, every manufacturer has the following annual total cost function:

$$TC_i(q_i) = 100 + q_i^2,$$

where q_i the quantity that manufacturer i produces. The annual market demand is:

$$q = 100 - 2p,$$

where p is the price, and q is the quantity demanded. According to the idea of contestable market, how many manufacturers will be in this industry in the long run?

5. A monopolist considers to engage in third-degree price discrimination in his two markets. The monthly demand in each market is:

$$q_1 = 100 - p_1,$$

$$q_2 = 80 - p_2,$$

where q_i and p_i denote the quantity and price in market i . The monopolist distributes his outputs q in two markets in such a way that his total revenue could be maximized.

- (a) (3 points) Please drive his marginal revenue function when he has q units at hand.

(b) (4 points) The monopolist's total cost function is:

$$TC(q) = q^2.$$

How will he price his products in these two markets?

6. (3 points) A and B run for an election and need to maximize their votes by positioning themselves along a line segment $[0,1]$ which reflects inclination to liberalism. The distribution of their voters's inclinations can be described by the following density function:

$$\begin{aligned} f(x) &= 6x, \text{ for } x \in [0, 1/3] \\ &= 3 - 3x, \text{ for } x \in [1/3, 1]. \end{aligned}$$

A voter will vote for the candidate whose opinion about liberalism is closer to his own. In equilibrium, how will A and B position themselves?

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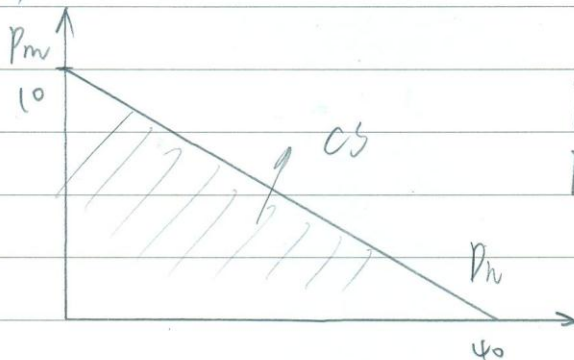
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1.

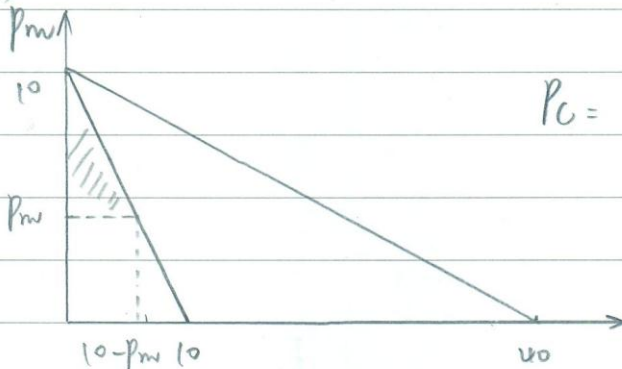
(a)



$$P_m = 0$$

$$P_C = 200$$

(b)



$$P_C = \frac{(10 - P_m)^2}{2}$$

2.

(a)

$$\max_{q_1} q_1 (120 - q_1 - q_2 - q_3 - P_w)$$

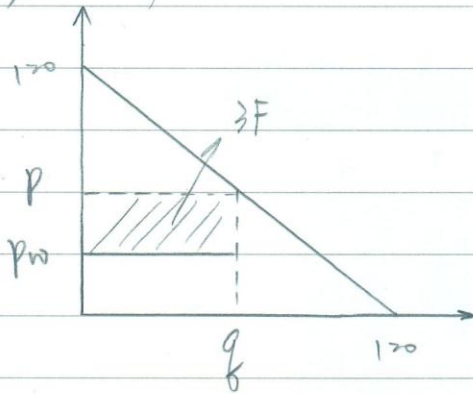
$$\text{FOC } q_1 = \frac{120 - q_2 - q_3 - P_w}{2}$$

$$\text{同理 } q_2 = \frac{120 - q_1 - q_3 - P_w}{2}, \quad q_3 = \frac{120 - q_1 - q_2 - P_w}{2}$$

$$\Rightarrow q_1 = q_2 = q_3 = 30 - \frac{P_w}{4}$$

$$\therefore p = 120 - q = 120 - 3\left(30 - \frac{P_w}{4}\right) = 30 + \frac{3}{4}P_w$$

(b)



$$\max 3F + p_w \cdot q$$

$$\therefore q = 60 \Rightarrow p = 60$$

$$\text{代回 (a) 小題} \Rightarrow p_w = 40$$

$$\therefore F = 400$$

3.

(a) (R, 若 R 則 r)

(b)

	l	r
L	(1, 3)	(1, 3)
R	(0, 0)	(2, 1)

$$(c) (R, r), (L, l), (L, q l + (1-q) r), q \geq \frac{1}{2}$$

4.

$$\min_{q\bar{x}} AC(q\bar{x}) = \frac{100}{q\bar{x}} + q\bar{x}$$

$$\Rightarrow \frac{100}{-q\bar{x}^2} + 1 = 0, \therefore q\bar{x} = 10, AC\bar{x}(10) = 20 (\text{= 長期均衡})$$

$$\text{市場需求: } q = 100 - 2 \times 20 = 60$$

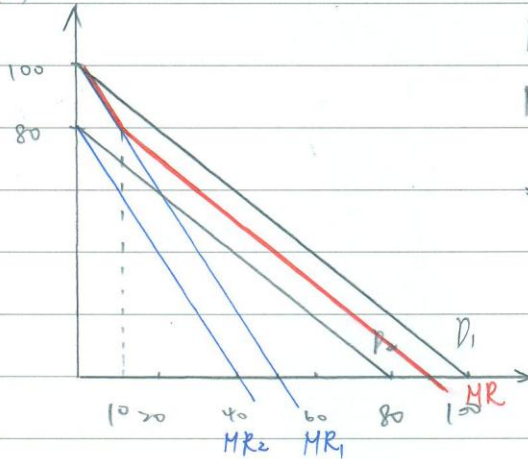
$$\text{廠商家數: } q \div q\bar{x} = 60 \div 10 = 6 \text{ 家}$$

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5.

(a)



$$MR_1 = 100 - 2q_1$$

$$MR_2 = 80 - 2q_2$$

$$\Rightarrow MR = \begin{cases} 100 - 2q, & \text{for } q \leq 10 \\ 90 - q, & \text{for } q \geq 10 \end{cases}$$

(b)

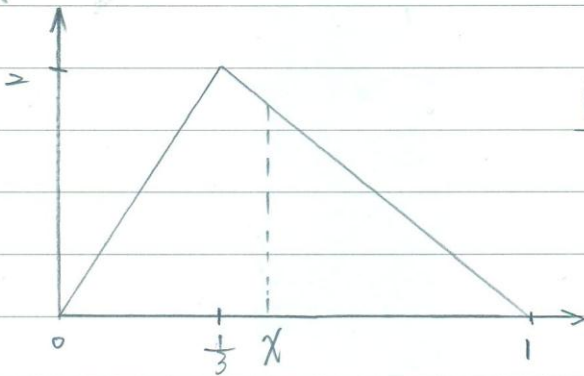
$$TC(q) = q^2$$

$$\text{當 } MC = 2q = 90 - q = MR \text{ 時, } q = 30.$$

$$\Rightarrow q_1 = 20, p_1 = 80$$

$$q_2 = 10, p_2 = 90$$

6.



$$\frac{(1-x)(3-3x)}{2} = \frac{1}{2}$$

$$x = 1 - \frac{1}{\sqrt{3}}$$