

總分 31 分。答題皆須附說明，未做解釋的答案概不計分。

1. (3 points) In the following game, the first element of the payoff vector denotes the row player's payoff, and the second element of the payoff vector denotes the column player's payoff. Please find all the Nash equilibria.

	t1	t2	t3
s1	1, 3	100, 2	0, 2
s2	0, 2	200, 1	1, 3

2. A monopolist produces and distributes his products in market A and market B in which it is possible to set different prices. The market demand for these two markets are:

$$Q_A = 20 - 2P_A,$$

$$Q_B = 40 - 8P_B,$$

where Q_i and P_i denote quantity and price in market i , $i = A, B$.

- (a) (1 point) If the monopolist only sells in market A, please derive the marginal revenue function $MR_A(Q_A)$.
- (b) (2 points) Actually when Q units are produced, they will be distributed to two markets to maximize total revenue. Please derive the marginal revenue function $MR(Q)$, and calculate $MR(4)$ and $MR(10)$.
- (c) (4 points) The total cost function is: $TC(Q) = Q^2/10$. Please solve for the optimal prices in two markets, P_A and P_B .
3. A monopolist has two retailers to sell his products. The market demand is:

$$q = 120 - p,$$

where q is the quantity and p is the price. Given the whole price θ set by the monopolist, a retailer could obtain at θ any unit she wishes. These two retailers will be engaged in a Cournot competition.

- (a) (2 points) If $\theta = 30$, what will be the equilibrium retail price p ?

- (b) (2 points) There is no production cost for this monopolist. Please determine the optimal whole price for him.

4. In a village, there is only one amusement park which is in the position to set the price. It is costless to run the rollercoaster, so the park owner simply wishes to maximize revenue. Every customer has the same demand:

$$q = 50 - p,$$

where p is the ticket price of a ride.

- (a) (2 points) If the park owner considers only to sell ride tickets, please decide the optimal price for him.
- (b) (2 points) If the park owner turns to consider to set a two-part tariff: an admission fee to the park and a ticket price per ride, what is the optimal two-part tariff?
- (c) New people move into this village, their individual demand, different from the old resident's, is:

$$q = 75 - 1.5p.$$

The number of these new residents is the same as the number of old residents. The park owner reconsiders the situation and designs a two-part tariff to attract both types of customers.

- i. (1 point) Under the optimal two-part tariff, what is the consumer's surplus of an old resident?
- ii. (2 points) What is the ticket price per ride under the optimal two-part tariff?
- iii. (1 point) Under the scheme of a two-part tariff, is it better to attract both types of customers or to attract only one type of customers?

5. A competitive firm facing a price of \$20 per unit for his product pollutes the air when producing for the market. His own marginal production cost is:

$$MC(q) = q,$$

where q denotes his production units. At the mean time, the pollution harms his neighbors's health and consequently increases neighbors's medical expenses. The more he produces, the larger their medical bills become and the marginal medical expenses are:

$$ME(q) = q.$$

- (a) (2 points) Suppose there are no transaction costs, that there is no legal penalty for polluting, and that it is impossible for the neighbors to move. What quantity does the firm produce? Give a concrete description of a deal that might be struck between the firm and the neighbors.
- (b) Suppose transaction costs are so high that negotiation is impossible, and that it would cost the neighbors \$90 to move. Under each of the following scenarios, determine whether or not the neighbors move, and determine how much the firm produces.
- (1 point) The firm faces no penalty for pollution.
 - (1 point) The firm must reimburse the neighbors for all pollution damage.
 - (2 points) Reconsider scenarios i and ii. Which one is more efficient?
6. There are several piles of matchsticks. Two players alternate in moving. When it is your turn to move, you must select one of the piles and remove at least one matchstick from that pile. The last player to take a matchstick is the winner.
- In the following games, you move first. and try to make sure you will win.
- (a) (1 point) If there are 2 piles. The 1st pile has 1 matchstick and the 2nd pile has 2 matchsticks. What is your first move?
- (b) (2 points) If there are 3 piles. The 1st pile has 1 matchstick, the 2nd pile has 2 matchsticks, and the 3rd pile has 4 matchsticks. What is your first move?

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