

科目：個體經濟學

系所組：經濟研究所

1. Suppose that there is only one firm in the market whose marginal production cost is  $c$ . The market demand is given by  $P = a - bQ$ , where  $P$  is the market price and  $Q$  is the quantity demanded. Please draw a graph and answer the following questions.
- (1) If the firm is a private-owned company whose object is to maximize its profit, please derive the equilibrium output, price and the corresponding social welfare. (5%)
  - (2) If the firm is a state-owned company whose object is to maximize social welfare, please derive the equilibrium output, price and the corresponding social welfare. (5%)
  - (3) If the owner of the firm delegates the business to a manager whose object is to maximize the total revenue of the firm, please derive the equilibrium output, price and the corresponding social welfare. (5%)
  - (4) If the firm is able to adopt (perfectly) first-degree price discrimination, please derive the equilibrium output and the corresponding social welfare. (5%)

2. Suppose that two lotteries have the same three payoffs, but the probability associated with each payoff differs, as illustrated in the table below:

Payoff	Probability (Investment A)	Probability (Investment B)
\$100	20%	30%
\$200	60%	40%
\$300	20%	30%

- (1) Find the expected return and standard deviation of each lottery. (8%)
  - (2) Robert has the utility function  $U = I$ , where  $I$  denotes the payoff. Which lottery will he buy? (4%)
  - (3) Simon has the utility function  $U = \sqrt{I}$ . Which lottery will he buy? (4%)
  - (4) Harley has the utility function  $U = I^2$ . Which lottery will she buy? (4%)
3. Consider two firms, Firm 1 and Firm 2, facing the inverse demand curve  $P = 100 - 5Q$ , where  $Q = Q_1 + Q_2$ . Their cost functions are  $C_1(Q_1) = 20 + 10Q_1$  and  $C_2(Q_2) = 10 + 12Q_2$ , respectively.
- (1) Suppose the two firms form a cartel to maximize joint profits. Calculate the equilibrium output and profit for this cartel. (5%)
  - (2) Find the Cournot-Nash equilibrium. Calculate the output and profit of each firm at this equilibrium. Draw the firms' reaction curves and show the equilibrium. (5%)

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部份可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

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- (3) Derive the equilibrium output and profit for each firm when they compete in Bertrand fashion. (5%)
- (4) Derive the equilibrium output and profit for each firm when Firm 1 acts as a Stackelberg leader. (5%)
4. Suppose the utility function is  $U = XY$ . Draw budget lines and indifference curves to illustrate the utility-maximizing choice associated with two goods,  $X$  and  $Y$ . Use your graph to answer the following questions.
- (1) Could both  $X$  and  $Y$  be inferior goods? (5%)
- (2) Are  $X$  and  $Y$  necessarily net substitutes? (5%)
5. The production function for a firm is given by :  $Q = \sqrt{LK}$ , where  $Q$  is the number of outputs produced per day,  $K$  is hours of machine time, and  $L$  is hours of labor input. The price for  $L$  and  $K$  are  $w = 2$  and  $r = 1$ , respectively .
- (1) Derive the return to scale of the production function. (5%)
- (2) Derive that the marginal returns of labor is diminishing. (5%)
- (3) Suppose that  $K = 16$  and  $Q = 400$ , derive the short-run average cost function. (5%)
- (4) Derive the long-run average cost function when  $Q = 400$ . (5%)
6. The equilibrium output and price of the ice cream are 100 and 25, respectively. In equilibrium, the price elasticity of demand of the ice cream is -2, and the price elasticity of supply of the ice cream is 1/2. Derive the demand curve and the supply curve for the FJU ice cream. (10%)

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