## 個體經濟學期中考

總分49分(學期得分爲期中考得分\*40/49); 答題皆須附清楚的說明. 未做解釋的答案概不計分。

1. Consider an industry with two firms which have no production cost.

The market demand is:

$$q=120-p,$$

where q is the quantity and p is the price.

- (a) (3 points) What is the Cournot equilibrium?
- (b) (3 points) If the first firm is the Stackelberg leader and decides his quantity first, what is the Stackelberg equilibrium?
- (c) (2 points) Please put the first firm's output on the horizontal axis and the second firm's output on the vertical axis and draw the second firm's iso-profit curve when its profit is zero.
- 2. A firm which is a price taker in both the factor market and the product market, has the following production function:

$$y = (x_1 x_2)^{1/3},$$

where y is the output and  $x_i$  the amount of factor i, i = 1, 2. His cost is:

$$C = l + w_1 x_1 + w_2 x_2,$$

where l is a license fee and  $w_i$  is the price of factor i, i = 1, 2.

- (a) We first consider his situation in the short run: the license fee is already paid and factor 2's amount is fixed at  $\bar{x_2}$  while the amount of factor 1 is adjustable.
  - i. (2 points) Please derive the firm's short-run cost function  $C_s(w_1, w_2, l, \bar{x}_2, y)$ .
  - ii. (3 points) Please derive the firm's short-run supply function  $y(w_1, w_2, l, \bar{x}_2, p)$  where p is the product price.
- (b) We now consider his situation in the long run: the license fee is not paid yet, and both factors are variable factors.

- i. (2 points) Please calculate the technical rate of substitution.
- ii. (4 points) Please derive the firm's long-run cost function  $C_l(w_1, w_2, l, y)$ .
- iii. (3 point) Please derive the firm's long-run supply function  $y(w_1, w_2, l, p)$  where p is the product price.
- 3. Consider an industry of perfect competition. Every firm has the same total cost function:

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$$c(y)=y^2+16,$$
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where y is a firm's output. The market demand is:

enomorphist where two packages for his customers 
$$q=104-p,$$

when q is the quantity and p is the price.

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- (a) (2 points) In the long run, firms are free to enter or leave the industry. What is the market price in the long-run equilibrium?
- (b) (2 points) How many firms will be in the industry in the long-run equilibrium?
- (c) After the long run equilibrium is reached for some time, the market demand suddenly increases to:

(4 points) 
$$q = 1361 = p$$
 ustomer needs to first pay a memoriship fee M and then he could purchase any amount at the unit price

In the short run, no firm could enter this industry.

- i. (2 points) What is the market price in a short-run equilibrium?
- ii. (2 points) At the short-run equilibrium, what is a firm's producer surplus?
- iii. (2 points) At the short-run equilibrium, what is a firm's profit?
- iv. (2 points) How many firms will be in the industry in a long run equilibrium?

4. A monopolist has two customers. The first customer's demand for his good is:

$$q_1 = 80 - p$$

and the second customer's demand is:

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$$q_2 = 100 - p$$

where p is the price and  $q_i$  is the quantity, i = 1, 2. With no cost at all, the monopolist simply wishes to maximize his revenue.

- (a) (2 points) What is the best price to charge if the monopolist charges a single price to these two customers?
- (b) (2 points) If the monopolist could practice the first-degree price discrimination, how many units will he sell to the first customer? And what is his revenue from the first customer?
- (c) If the monopolist wishes to offer two packages for his customers to select:  $(q_1, T_1)$  and  $(q_2, T_2)$  where  $q_i$  is the purchase quantity and  $T_i$  is the total payment for  $q_i$ , i = 1, 2.  $(q_1, T_1)$  is aimed for the first customer and  $(q_2, T_2)$  is aimed for the second customer.
  - i. (3 points) The monopolist first considers to set  $q_2$  to be 80. Please decide  $q_1$ ,  $T_1$  and  $T_2$  for him
  - ii. (2 points) What is the optimal  $q_2$ ? And when  $q_2$  is set to be the optimal, what is the optimal  $q_1$ ?
- (d) (2 points) What is his optimal third-degree price discrimina-
- (e) (4 points) Suppose a customer needs to first pay a membership fee M, and then he could purchase any amount at the unit price p. What are the optimal M and p?

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