| 系級 | 經濟學系碩士班 | 考試時間 | 100 分鐘 |
|---|---|---|---|
| 科目 | 個體經濟學 | 本科總分 | 100 分 |

1. (15 points) The production function is $f(x) = 20x - x^2$ and the price of output is normalized to 1. Let $w$ be the price of the $x$-input. We must have $x \geq 0$.

   a) (3 points) What is the first-order condition for profit maximization if $x > 0$?
   b) (3 points) For what values of $w$ will the optimal $x$ be zero?
   c) (3 points) For what values of $w$ will the optimal $x$ be 10?
   d) (3 points) What is the factor demand function?
   e) (3 points) What is the profit function?

2. (20 points) U.S. consumers have a demand function for umbrellas which has the form $D(p) = 90 - p$. Umbrellas are supplied by U.S. firms and U.K. firms. For simplicity, assume that there is a single representative firm in each country that behaves competitively. The cost function for producing umbrellas is given by $c(y) = y^2/2$ in each country.

   a) (5 points) What is the aggregate supply function for umbrellas?
   b) (5 points) What is the equilibrium price and quantity sold?
   c) (5 points) Now the domestic (U.S.) industry lobbies for protection and Congress agrees to put a \$3 tariff on foreign (U.K.) umbrellas. What is the new U.S. price for umbrellas paid by the consumers?
   d) (5 points) How many umbrellas are supplied by foreign firms and how many are supplied by domestic firms?

3. (15 points) A monopolist has a cost function of $c(y) = y$ so that its marginal costs are constant at \$1 per unit. It faces the following demand curve:

$$D(p) = \begin{cases} 0, & \text{if } p > 20; \\ 100/p, & \text{if } p \leq 20. \end{cases}$$

   a) (5 points) What is the profit-maximizing choice of output?
   b) (5 points) If the government could set a price ceiling on this monopolist in order to force it to act as a competitor, what price should they set?
   c) (5 points) What output would the monopolist produce if forced to behave as a competitor?

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4.  (20 points) Three oligopolists operate in a market with inverse demand given by $P(Q) = a - Q$, where $Q = q_1 + q_2 + q_3$ and $q_i$ is the quantity produced by firm $i$. Each firm has a constant marginal cost of production, $c$, and no fixed cost. The firms choose their quantities as follows: (1) firm 1 chooses $q_1 \geq 0$; (2) firms 2 and 3 observe $q_1$ and then simultaneously choose $q_2 \geq 0$ and $q_3 \geq 0$, respectively. What is the subgame perfect Nash equilibrium outcome?

5.  (20 points) Consider a two-consumer, two-good exchange economy. Utility functions and endowments are

$u^A = x_1 x_2$ and $w^A = (6, 4)$.

$u^B = x_1(x_2 + 2)$ and $w^B = (4, 6)$.

a) (10 points) Depict the Pareto-efficient allocations in Edgeworth box.

b) (10 points) Find the Walrasian equilibrium (i.e. $(x_1^{A*}, x_2^{A*}, x_1^{B*}, x_2^{B*})$ and $(p_1^*, p_2^*)$).

6.  (10 points) An expected utility maximizer has the Bernoulli utility function $u(w) = w^{1/2}$ where $w$ is wealth. He has $100 but with probability one-half he will lose $36 (otherwise he retains $100). What is the maximum amount he is willing to pay to avoid the gamble?