Intermediate Microeconomics 301  
Final Exam  
Monday, May 3, 2004

Time: 2 hours.

Instructions. To obtain credit, you must give arguments to support your answer. The numbers in brackets at the start of each question are the numbers of points the questions are worth.

Exercise 1 [15]: Consumer theory
Allison’s utility function is 
\[ U = X_1 X_2 \]
The price of \( X_1 \) is \( p_{X_1} = $2 \) and the price of \( X_2 \) is \( p_{X_2} = $4 \), and his income is \( m = $40 \). What is her optimal consumption bundle? Give also a graphical representation.

Exercise 2 [15]: Producer theory
If each competitive firm in an industry has the short-run cost function 
\[ C(q) = 200 + \frac{1}{2}q^2, \]
1. What is the individual supply of each firm? Represent the supply function in a graph.
2. If the market price is $20, what is the profit-maximizing output level for each firm? What is the total revenue? What are the profits?

Exercise 3 [25]: Supply and Demand
The domestic supply and demand curves for good \( A \) are given by 
\[ P = 10 + Q \quad \text{and} \quad P = 100 - 2Q, \]
respectively, where \( P \) is the price in dollars per unit, and \( Q \) is the quantity in millions of unit per year. There is perfect competition in the world market and thus the total world supply is \( P = 10 \).

1. In absence of government policy, the U.S. supply is the world supply. What is the consumers’ surplus at the equilibrium price? What is the producer surplus?
2. Imagine now that the Congress restricts the importation of good \( A \). It is a very drastic policy and no importation is allowed. The only relevant supply is now the domestic supply. What is the consumers’ surplus? What is the producers’ surplus?
3. What is the effect of this policy on the total welfare? what is the deadweight loss?

Exercise 4 [15]: Price discrimination
A monopolist sells in two markets and practices price discrimination by charging separate prices in each market. The monopolist produces at constant marginal cost \( MC = 45 \). Demand in market 1 is \( Q_1 = 140 - 2p_1 \). Market 2 demand is \( Q_2 = 125 - p_2 \). What price will be charged in each market?

Exercise 5 [30]: Oligopoly
Two firms, Aubonvin and Wineryplus produce bottles of wine. The demand curve for bottled water is 
\[ P = 500 - 20Q \]
where \( P \) is the price (in cents) of a bottle of wine, \( Q = Q_1 + Q_2 \) is the total amount of bottled waters produced, \( Q_1 \) is the number of bottled waters produces and sold per month by Aubonvin, and \( Q_2 \) is the number of bottled waters produced and sold per month by Wineryplus. Each firm has the same marginal cost of 20 and fixed costs of zero.
1. If each of these two firms sets its own output level to maximize its profits, assuming that the other firm holds constant its output level, what will be the output for each firm? (hint: determine the Cournot Equilibrium). What will be the equilibrium price? What will be the profit for each firm?

2. Suppose now a Stackelberg model in which Aubonvin decides first its quantity, and then, Wineryplus observes the quantity supplied by Aubonvin, and chooses its own quantity. Determine the quantity that each firm will supply. At what price? What will be the profit for each firm?

3. Compare and contrast the output levels and profits for the Cournot and Stackelberg models.