Intermediate Microeconomics 301

Final Exam

May, 7 2003

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
Lauren has a monthly income of $400, which she allocates between two goods: milk, $M$, and chocolate, $C$.

1. Suppose chocolate costs $4 per bar and milk costs $2 per bottle. Draw her budget constraint.

2. Suppose also that her utility function is given by the equation $U(M, C) = MC$. What combination of milk and chocolate should she buy to maximize her utility?

3. Suppose the price of chocolate increases to $5 per bar. What does her budget constraint look like now? What combination of milk and chocolate maximizes her utility?

Exercise 2 [20]: Demand and Supply
A new product is introduced to the market. Initially, demand is $Q_D = 1,000 - 2p$ and supply is $Q_S = 100 + p$. Determine the equilibrium price and quantity. The government then decides that no more than 300 units of this product should be sold per period, and imposes a quota at that level. How does this quota affect the equilibrium price and quantity? Show the solution using a graph and calculate the numerical answer.

Exercise 3 [20]: Producer Theory
Suppose a production function is given by $f(K, L) = K^{\frac{1}{3}}L^{\frac{2}{3}}$, the price of capital is $10 and the price of labor is $16.

1. Does the technology exhibits increasing, decreasing or constant return to scale?

2. What is the marginal product of capital? of labor? What is the Marginal rate of technical substitution?

3. The capital is fixed at the level $K = 8$.
   (a) What is the quantity of labor that minimizes the cost of producing any given input?
   (b) What is the minimum cost of producing $q$ units of output?
**Exercise 4 [15]: Nash Equilibrium**

An old lady is looking for help crossing the street. Only one person is needed to help her; more are okay but no better than one. You and I are the two people in the vicinity who can help; each has to choose simultaneously whether to do so. Each of us will get a pleasure worth a 3 from her success (no matter who help her). But each one who goes to help will bear a cost of 1, this being the value of our time taken up in helping. Set this up as a game. Write the payoff table and find all pure strategy Nash Equilibrium.

**Exercise 5 [30]: Oligopoly**

In a Cournot duopoly, each firm has a marginal cost of 40 (i.e., the total cost for each firm $i$ is $c_i(q_i) = 40q_i$), and market demand is $Q = 100 - 2p$ (recall that $Q = q_1 + q_2$)

1. What are the best response functions of each firm?
2. What is the best output level for each firm?
3. How does the total output level compare to the cartel output level?