

Econ306–Intermediate Microeconomics

Fall 2007

Final exam

The exam consists of 5 questions and one bonus questions. If you have the time, you can attempt the bonus question and earn extra credit.

The duration of the exam is 120 minutes. DO NOT OPEN the exams until you are told to do so and STOP writing when you are told that the exam is over. **Failure to comply will result in a 10% loss in the grade.**

Do not forget to write your name and university ID number on the booklet.

NO PROGRAMMABLE OR FINANCIAL CALCULATORS ARE ALLOWED. Only simple or scientific calculators can be used.

GOOD LUCK!

Question 1

John loves root beer floats, which he makes by combining one glass of root beer and two scoops of ice cream. Jane is on a diet that assigns points to food and drinks. One glass of root beer is one point and one scoop of ice cream is one point. She can consume any combination of root beer and ice cream as long as the total number of points is two.

- (i) What kind of goods are root beer and ice cream for John? Show his indifference curves on a graph.
- (ii) What kind of goods are root beer and ice cream for Jane? Show her indifference curves on a graph.
- (iii) Suppose that Jane and John decide to have a private party. John brings one bottle of root beer (8 glasses) and Jane brings one box of ice cream (16 scoops). Represent this two-consumer, two-good exchange economy in an Edgeworth box, remembering to indicate the endowment point.
- (iv) Find the contract curve in this economy.
- (v) What is the equilibrium point in this Edgeworth box? What is the price ratio? (Hint: At the equilibrium, the slope of the budget line is equal to the slope of the indifference curves or is “tangent” to them, and the budget line has to pass through the endowment point.)

Question 2

In 1990, the town of Ham Harbor had a more-or-less free market in taxi services. Any respectable firm could provide taxi service as long as the drivers and cabs satisfy certain safety standards. Suppose that the marginal cost per trip of a taxi ride is constant, $MC = \$5$, and that each taxi has a capacity of 20 trips per day. Let the demand function for taxi rides be given by $D(p) = 1,200 - 20p$, where demand is measured in rides per day. Assume that the industry is perfectly competitive.

- (i) What is the competitive equilibrium price per ride? (Hint: Use the marginal output rule and remember that the marginal revenue equals the price in a competitive market.)
- (ii) What is the equilibrium number of rides per day? How many taxicabs will there be in equilibrium?
- (iii) In 1990, the city council of Ham Harbor created a taxicab licensing board and issued a license to each of the existing cabs. The board stated that it would continue to adjust the

taxicab fares so that the demand for rides equals the supply of rides, but no new licenses will be issued in the future. In 1995, costs had not changed, but the demand curve for taxicab rides had become $D(p) = 1,220 - 20p$. What was the equilibrium price of a ride in 1995?

(iv) What was the profit per ride in 1995, neglecting any costs associated with acquiring a taxicab license?

(v) What was the profit per taxicab license per day in 1995?

(vi) How much money would each current taxicab owner be willing to pay to prevent any new licenses from being issued?

Question 3

A firm has a short-run variable cost function $VC_{SR}(Q) = Q^3 - 10Q^2 + 30Q$.

(i) Derive the firm's short-run average cost function.

(ii) Derive the firm's short-run marginal cost function.

(iii) Find the optimal (cost-minimizing) level of production for the firm.

(iv) Calculate the short-run marginal and average cost at this production level.

(v) Find the profit-maximizing level of production for the firm.

(vi) If the market price is $p = \$18$, how much would the firm decide to produce? (Note: If you obtain two possible values for Q , choose the highest.)

(vii) Calculate the economic profit of the firm when the market price is $p = \$18$ (remember that only variable costs are economic costs). How much will the profit be in the long run if the firm operates in a perfectly competitive market?

Question 4

Furry Toys Co. uses robots and workers to produce Teddy-bears. The production function is "nice", in the sense that the isoquant lines are smooth curves. The rental price of a robot is \$200 per day and the wage of a worker is \$150 per day.

(i) Draw the isocost line corresponding to an expenditure of \$4,200 (remember to label the intercepts and to calculate the slope of the isocost line).

(ii) Suppose that the combination of 10 robots and 8 workers is minimizing the cost of producing 100 Teddy-bears. Is this combination on the \$4,200 isocost line? Show on a graph how this optimal mix of inputs would be found by the firm.

- (iii) If the marginal physical product of labor is 5 at the cost minimizing input bundle in the previous part, solve for the marginal physical product of capital.
- (iv) For the next questions, suppose that the wage of a worker increases to \$200. How do the isocost lines change?
- (v) How does the total cost change if the firm decides to keep producing 100 Teddy-bears?
- (vi) How does the optimal mix of inputs change?

Question 5

Suppose that the demand curve for apples is given by $Q^d = 200 - 5p$, where Q^d is the number of pounds demanded per year and p is the price per pound. The supply of apples can be described by $Q^s = 40 + 3p$, where Q^s is the number of pounds provided.

- (i) What is the equilibrium price? (Hint: At the equilibrium, quantity demanded and quantity supplied are equal, $Q^d = Q^s$.)
- (ii) What is the equilibrium quantity supplied and demanded?
- (iii) Calculate the consumer surplus at the equilibrium price.
- (iv) Calculate the producer surplus at the equilibrium price.
- (v) Calculate the total surplus at the equilibrium price.
- (vi) Now suppose that the government imposes a tax of \$8 per each pound sold, paid by the consumers, which effectively reduces the quantity sold and demanded to 85 pounds. In this case, what are the price and the consumer surplus?

Question 6 (*extra credit*)

This comes from an actual newspaper story. “The average price of a home in W County rose more than 12% last year but the number of sales fell nearly 15%. ‘It’s the old law of supply and demand,’ said a spokesman for the Board of Realtors. ‘The number of sales is down because there’s a higher demand for properties but there isn’t a corresponding number to sell.’”

- (i) What does the “old law of supply and demand” predict would happen to price and quantity if the demand curve shifts outward and the supply curve does not change?
- (ii) Draw a diagram to illustrate the case of a shift in demand and/or supply curves that is consistent with the observed change in prices and quantities.