

ECO 300 – MICROECONOMIC THEORY
Fall Term 2005
PROBLEM SET 5
Due 12.20 p.m. on Thursday November 17

Question 1: (Multiple choice, total 20 points)

1. A price taker is
 - a. a firm that accepts different prices from different customers.
 - b. a consumer who accepts different prices from different firms.
 - c. a perfectly competitive firm.
 - d. a firm that cannot influence the market price.
 - e. Both (c.) and (d.).
2. The textbook for your class was not produced in a perfectly competitive industry because
 - a. there are so few firms in the industry that market shares are not small, and firms' decisions have an impact on market price.
 - b. upper-division microeconomics texts are not all alike.
 - c. it is not costless to enter or exit the textbook industry.
 - d. of all of the above reasons.
3. Bette's Breakfast, a perfectly competitive eatery, sells its "Breakfast Special" (the only item on the menu) for \$5.00. The costs of waiters, cooks, power, food etc. average out to \$3.95 per meal; the costs of the lease, insurance and other such expenses average out to \$1.25 per meal. Bette should
 - a. close her doors immediately.
 - b. continue producing in the short and long run.
 - c. continue producing in the short run, but plan to go out of business in the long run.
 - d. raise her prices above the perfectly competitive level.
 - e. lower her output.
4. In the short run, a perfectly competitive firm earning negative accounting profit is
 - a. on the downward-sloping portion of its AC curve.
 - b. at the minimum of its AC curve.
 - c. on the upward-sloping portion of its AC curve.
 - d. above its AC curve.
5. An industry analyst observes that in response to a small increase in price, a competitive firm's output sometimes rises a little and sometimes a lot. The best explanation for this finding is that
 - a. the firm's marginal cost curve is random.
 - b. the firm's marginal cost curve has a very small positive slope.
 - c. the firm's marginal cost has a very large positive slope.
 - d. the firm's marginal cost curve is horizontal for some ranges of output and rises in steps.
 - e. the firm's marginal cost curve is downward sloping.

Question 2: (total 80 points)

In this question, the graphs you are asked to draw don't have to be very accurate, but they should represent the magnitudes reasonably clearly.

In this problem we will consider the fish industry on the island of San Serife. For this purpose we will aggregate all the other goods into one composite, and measure it in units of the island's currency Arial. Thus the price of the other good is 1. By way of notation, we will use p for the price of fish, q for the quantity of fish pertaining to each consumer or to each firm, and Q for the quantity of fish for the whole industry.

[a] (7 points) Each consumer on San Serife has a “quasi-linear” utility function

$$U(q, y) = y + 10q - 5q^2,$$

where q is the consumption of fish and y the consumption of the other good. If the consumer's income is I , the budget constraint is $y + pq = I$. Solve this for y and substitute into the utility function. Find the q that maximizes the resulting expression for utility. (Assume that I is large enough that the consumer's utility maximization problem does not have a corner solution at $y = 0$.) Prove that each consumer's demand function for fish (q expressed as function of p) is

If $p \geq 10$, then $q = 0$

If $p < 10$, then $q = 1 - p/10$.

[b] (3 points) There are 160 consumers on San Serife. Find the market demand function. Show this in a graph with p on the vertical axis and the market quantity Q on the horizontal axis.

[c] Each fish-industry firm, to produce and sell anything at all, must get a boat and hire a market stall. The cost per period of owning a boat (the “user cost of capital”, consisting of the interest on the money tied up and the depreciation) is 3 Arians, and the cost of hiring a market stall is 1 Arial. In the long run, both of these costs are fixed but avoidable. In the short run, the cost of the boat is (fixed and) sunk (The cost is sunk, not the boat!) because boats have no alternative use, whereas the cost of the market stall is (fixed but) avoidable because the same stall can be used to sell other things. The variable cost of producing output q is q^2 .

(10 points) Write down expressions for each firm's long run total cost (LRTC), long run average cost (LRAC), short run total avoidable cost (SRTAC), short run average avoidable cost (SRAAC), and marginal cost (MC), in each case as functions of q .

(8 points) Find the values of q that minimize LRAC and SRAAC, and the minimum values of these two average costs.

(3 points) Find the equation for the firm's short run supply curve.

(5 points) Draw rough sketches of the average and marginal costs and the short run supply curve.

[d] (4 points) In the long run, there is free entry and exit of fishing firms. What is the industry's long run supply curve?

[e] (4 points) Suppose the industry is initially in long run equilibrium. Draw a figure showing the market demand curve you found in part (a) and the industry supply curve you found in part (d).

Note: In later parts of the question you will be asked to draw figures showing other curves, areas, etc. You can, in the answer you turn in after you have solved all the parts, show just one combined figure that has all the information required, or keep the figures separate, as you wish.

(5 points) Find the long run equilibrium price. How many firms operate in this equilibrium? What is the profit of each? What is the total of all consumers' surpluses?

[f] Now suppose the government levies a tax of 3.75 Arians per unit of fish.

(4 points) Find the new short run supply curve, assuming that the industry has the same number of firms as in the original long run equilibrium.

(4 points) Draw a figure showing the demand curve and the short run supply curve, and find the new short run equilibrium.

(5 points) What is the price paid by the consumers? What is the price received by the firms? What is the profit of each firm? Do your answers justify the assumption underlying your short run supply curve, namely that no firms want to exit in the short run?

(4 points) What is the aggregate loss of consumer surplus? How much tax revenue does the government collect? What is the dead-weight loss?

[g] (5 points) Will firms want to exit in the long run with the tax? In this new long run equilibrium, what is the price paid by the consumers? What is the price received by the firms? How many firms are active? What is the profit of each firm?

(4 points) What is the aggregate loss of consumer surplus? How much tax revenue does the government collect? What is the dead-weight loss?

[h] (5 points) Is the dead-weight loss higher in the long run or the short run? What is the economic intuition for this?