ECO 610-401
Fall 2002
Problem Set \#4
Due: Monday, November 18, 2002

1. Pork production, i.e., hog farming, is a perfectly competitive industry currently in long-run equilibrium. Market price is in the $\$ .50 / \mathrm{lb}$. range for slaughtered hog carcasses. Technological advances in pork production loom on the horizon. Some firms have experimented with "factory farm" approaches to raising hogs similar to the changes that swept the poultry industry over a decade ago. These changes in the production process result in a larger minimum efficient scale for hog farms, and the total economic cost of raising hogs drops from roughly $\$ .50 / \mathrm{lb}$. to $\$ .40 / \mathrm{lb}$. You work for a large food conglomerate, and are assigned the task of evaluating the effect these changes will have. In a step-by-step fashion, describe the changes that will occur in the pork market and tell what will happen to the average size of a hog farm, the price of pork, the market output of pork, and the short-run and long-run profits from hog farming. Use diagrams to illustrate and explain your answer.
2. As the only owner of a satellite dish in your neighborhood, you are the monopoly supplier to anyone who wants to watch the upcoming World Wrestling Federation championship match, which is only available on pay-per-view. You decide to charge your neighbors an admission fee if they want to come over and watch the match at your house. From past experience you know that the demand schedule is as represented below. Since these people drink your beer, eat your food, and tear up your house, there are costs involved in supplying this service. Your total cost schedule is also represented below. (a) What price should you charge and what output will you produce if you want to maximize profits? (b) If you have to pay a fixed fee of $\$ 10$ to the satellite company in order to receive an unscrambled signal, would you still be willing to go ahead with this?

| Price |
| :---: |
| - |
| $\$ 10.00$ |
| 9.80 |
| 9.60 |
| 9.40 |
| 9.20 |
| 9.00 |
| 8.80 |
| 8.60 |
| 8.40 |
| 8.20 |
| 8.00 |
| 7.80 |


| Quantity | $\frac{\text { Total Cost }}{0}$ |
| :---: | :---: |
| 0 | $\$ 8.00$ |
| 1 | 15.00 |
| 2 | 21.00 |
| 3 | 27.50 |
| 4 | 34.50 |
| 5 | 41.80 |
| 6 | 49.35 |
| 7 | 57.00 |
| 8 | 65.00 |
| 9 | 74.00 |
| 10 | 84.00 |
| 11 | 95.00 |

3. Your company produces agricultural equipment. Since you are in charge of forecasting sales, you are very interested in what happens in markets for various agricultural products. One market that has seemed to be stable lately has been the market for tobacco. You see a significant decline in the demand for tobacco looming on the horizon. Now for the question. Assume that the market for tobacco is initially in long-run equilibrium, at a price of $\$ 1.50$ per pound. Analyze in a step-by-step manner the short-run and long-run effects of a permanent decline in the market demand for tobacco. What prediction do you make about (a) the short-run price of tobacco; (b) the long-run price of tobacco; (c ) short-run profitability of tobacco farming; (d) long-run profitability of tobacco farming; and (e) the number of tobacco farmers. Use diagrams to explain your answers.
4. You have an exclusive license to sell a particular type of foam fire retardant and insulation used in the construction of commercial buildings. The demand equation for your product is: $\mathrm{Q}=15,000-10 \mathrm{P}$, where Q is the annual sales quantity in tons and P is the price per ton. Your total cost function (in dollars) is: $\mathrm{C}=$ $1,400,000+300 \mathrm{Q}+0.05 \mathrm{Q}^{2}$.
a) To maximize profit, how much foam insulation should you plan to produce and sell?
b) What price should you charge?
c) Compute your profits.
