
Final Exam

You have until 3:30pm to complete the exam, be certain to use your time wisely. Answer all questions directly on the exam. You must show all of your work to receive full credit. Calculators may be used although you may leave answers as fractions. Unless a problem says otherwise, you can assume that individuals can consume fractions of units and firms can use fractions of units of inputs and produce fractions of units of output. Remember to put your name on the exam. Good luck!

Name:

1. (20 points) Suppose that a local electricity provider has very high fixed costs and constant marginal costs for providing electricity. The demand curve for electricity is linear and downward sloping.
 - (a) Explain why for any given quantity of electricity it is socially efficient to have a single electricity provider rather than multiple electricity providers.
 - (b) Use a clearly labeled graph to determine whether the electricity provider would lose money if forced to provide the socially efficient level of electricity. You can assume that the local government can dictate the quantity of electricity but that the firm can then charge whatever price consumers are willing to pay at that quantity.
 - (c) On the same graph, show the largest quantity of electricity the local government could force the firm to provide before the firm decides to shut down.
 - (d) How would your answers to (a) and (b) change if demand for electricity was perfectly inelastic?

2. (20 points) There are two farmers growing corn, McDonald and Fannie. McDonald has good soil for growing corn. For every additional bushel he grows, his total costs increase by \$25. Fannie has bad soil, her costs rise by \$50 for every additional bushel of corn she grows. For simplicity, assume that each farmer has no fixed costs. The demand for corn is given by the following demand function:

$$D(p) = 900 - 9p \tag{1}$$

where p is the price of a bushel of corn. The two farmers compete by choosing quantities. The market price is then determined by what consumers are willing to pay for the combined output of the farmers.

- (a) Write down an equation for McDonald's profits (π_M) as a function of the bushels of corn grown by McDonald (B_M) and the bushels of corn grown by Fannie (B_F). Your equation should contain no parameters or variables other than B_M and B_F .
- (b) Given your equation in part (a), derive an expression giving McDonald's optimal quantity of corn B_M in response to Fannie's chosen quantity of corn B_F (you are deriving McDonald's best response function $B_M(B_F)$).
- (c) Derive Fannie's best response function, $B_F(B_M)$, giving Fannie's optimal quantity of corn as a function of the amount of corn grown by McDonald.
- (d) Find the equilibrium quantity of corn grown by McDonald and the equilibrium quantity of corn grown by Fannie.

3. (20 points) Consider a perfectly competitive market for pizza that is currently in long run equilibrium. All of the firms in this market are identical and have average costs that are a decreasing function of quantity at low quantities but an increasing function of quantity at larger quantities (in other words, a U-shaped average cost curve). The marginal cost curve for each firm is upward sloping. Suppose that an improvement in pizza oven technology shifts the average costs for all of these firms down at all quantities but does not change the quantity at which the average cost curve reaches its minimum. Use a graph of the market demand curve, short run industry supply curve and long run industry supply curve to show the effects of this technological change on the following:
- (a) The equilibrium price and quantity of pizza in the short run.
 - (b) The equilibrium price and quantity of pizza in the long run.
 - (c) Consumer surplus in the long run.

Clearly label all relevant curves and points on your graph and provide a written explanation of each change you show on the graph.

4. (20 points) A record store is going out of business and needs to sell off its inventory. It is the only record store in town and can therefore act as a monopolist. The store is considering two different strategies for its final weekend in business:
- i. Go with a simple approach of setting a single price per record and keeping the doors open to all customers.
 - ii. Have an exclusive event where individuals must pay admission to come to the event but then get lower prices per record.

The record store currently has a stock of 500 records and will simply throw out any records it doesn't sell over the weekend. For simplicity, assume that there is a single customer with the following demand curve for records:

$$D(p) = 500 - 25p \tag{2}$$

- (a) Determine the price the store will charge, the number of records that will be sold and the total profits the store will make if it takes the first approach.
- (b) Determine the admission fee the store will charge, the price it will charge per record, and the total profits the store will make if it takes the second approach.
- (c) A local government official is concerned that an exclusive event is unfair and is considering banning the practice of charging admission for exclusive sales. Would you support or oppose this ban? Be certain to fully explain your answer with a discussion of the welfare implications of the ban.

5. (20 points) A baker uses flour, milk and butter to make biscuits. Each biscuit requires one cup of flour, one cup of milk and two tablespoons of butter. This recipe must be followed exactly, otherwise the biscuits will be inedible.
- (a) Write down a function that gives the number of biscuits (B) that can be made as a function of the cups of flour (F), cups of milk (M) and tablespoons of butter (T) used. Note that the baker can make fractions of biscuits (so one and a half cups of flour, one and a half cups of milk and three tablespoons of butter could be used to make one and a half biscuits).
 - (b) Assume that flour, milk and butter are all variable inputs. The price of a cup of flour is \$1, the price of a cup of milk is \$2 and the price of a tablespoon of butter is \$0.50. Derive a function giving the bakers minimum costs as a function of the number of biscuits baked (B). Your function should contain only numerical constants and B , there should be no other variables in your function.
 - (c) Construct a graph showing the baker's demand for flour as a function of the price of flour. Your graph should have cups of flour (F) on the horizontal axis and the price of a cup of flour (p_F) on the vertical axis. You should label any kinks, intercepts and slopes with their exact numerical values if possible.