

SAMPLE MIDTERM EXAMINATION
(This exam was given Tuesday, October 26, 1999)

Directions: This is a closed-book exam. Please print your name clearly on each answer book.

Answer all questions as clearly and legibly as possible. The exam has a total of 250 points; the number of points and a suggested amount of time is indicated for each question. You must turn in this exam along with your answer books before leaving the room.

Students in the 8:30 a.m. section:

I will not discuss the contents of this exam with anyone in other sections before 1:00 p.m.

Students in the 10:30 a.m. and 11:30 a.m. sections:

I have not discussed the contents of this exam with anyone who took it earlier this morning.

Signed: _____

Print your name: _____

1. (100 points; 30 minutes) Decide whether each of the following six statements is **True**, **False**, or **Uncertain**, and give a **brief but clear explanation** of your answer. (Most of the credit will be given for the explanation.)

1a) The Blockbuster video store in Cambridge finds that demand for videos increases when the price charged by the video store in Somerville increases. These two stores are in the same market.

1b) Air France owns a fleet of Airbus planes of different vintages, including 5 new planes bought last year. Suppose that this year a strike of aircraft workers shuts down all Airbus production for an extended period, leading to delay of delivery and causing increases in the prices of used Airbus planes. Since Air France owns all of its planes, these price changes have no effect on the airline's average variable cost.

1c) Your company makes an electric drill for the retail market. Drill prices are described by the following hedonic price equation:

$$\text{Log } P = 3.60 + .039 \text{ Log } (M) - .583 \text{ Log } (W) + .778 \text{ Log } (L) + e ,$$

where P is price in dollars, M is the drill's maximum speed, W is weight in pounds and L is average life in years. "Log" indicates a natural logarithm. Your drill currently sells for a price of \$ 59.95, with a maximum speed of 4000 revolutions per minute, a weight of 10 pounds and an average lifetime of 7 years.

You can lower the weight of your drill from 10 pounds to 8 pounds by using lighter materials, at an additional cost of \$9.78 per drill. (The change would not affect drill speed or life). You should recommend making this change.

(Note: a log calculator is not needed for this question.)

1d) A firm with seller market power will never choose a level of output (and price) that yields negative marginal revenue in any period, even in the presence of positive network externalities for its product.

2. (50 points; 18 minutes) At present, the price of a football in the U.S. is \$10, and 5 million are sold annually. Market research has shown that the demand curves are linear, and that price elasticity of market demand is -4.0 and the price elasticity of supply is $+2.0$.

2a) Calculate the demand and supply curves for footballs for the U.S.

2b) The U.S. government proposes a \$3 tax on every football sold in the country. How much revenue will the tax raise, and how will the tax affect consumer surplus and producer surplus?

3. (50 points; 16 minutes) A monopolist must decide how to price in two markets and allocate product output between them. The markets are separated geographically (being either side of a national border). Demands in the two markets are the following:

$$Q_1 = 30 - 2P_1,$$

$$Q_2 = 24 - P_2.$$

The monopolist's cost is

$$C = 5 + 2(Q_1 + Q_2).$$

What are the prices charged, total product shipped to each market, and total profits under the following two conditions:

- 3a)** The markets are separated (the firm can ship to both markets, but there is no other trade in the particular good).
3b) The border is opened to free trade.

(Note: this is a problem from a Homework Set, with a revision in the numbers.)

4. (50 points; 16 minutes) A new heart drug has been developed by a U.S. government laboratory, and is to be licensed to private firms for production and marketing. The drug may be licensed to many firms, or to one firm only perhaps with a restriction on pricing. The demand for the drug will be

$$Q = 30 - 10P,$$

where Q is millions of units sold per week and P is the price in \$ per unit. The marginal cost of production is constant at \$1 per unit regardless of the size of the firm making it. The license is without a fee, and there are no fixed costs.

Under each of the following arrangements, calculate (1) the price per unit, and (2) the total producer's surplus (or economic profit) collected by the firm or firms.

- 4a)** The drug is licensed to a very large number of firms.
4b) The drug is licensed to a single firm, with no restriction on pricing.
4c) The drug is licensed to a single firm, but a ceiling price of \$1.20 per unit is imposed.