



**15.010 / 15.011 Economics Analysis For Business Decisions**

**HOMEWORK SET #6**

**(ATTENTION : Due Friday, December 3, 2004)**

**Name:** \_\_\_\_\_

**Section:** \_\_\_\_\_

**Please staple this sheet to the front of your answer set,  
Do NOT write your answers on this sheet.**



## **HOMEWORK SET #6**

**(ATTENTION : Due Friday, December 3, 2004)**

**DIRECTIONS:** Answer all questions and show your work. Your completed homework is to be placed **in the assignment box for your section before 4:30 p.m. Late homework sets will be not be corrected.**

Please read the statement on 15.010/15.011 homework policy contained in the course overview.

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### **Lecture 17: Transfer Pricing.**

1. Acme, Inc. has a monopoly over the production of calculators. Liquid crystal displays (LCDs) are an input into calculators. Acme has the capacity to produce its own LCDs. The demand for calculators is given by:

$$P = 135 - 2Q$$

One LCD goes into each calculator, and the cost of producing a calculator is \$10 over and above the cost of the LCD. Acme's cost function for producing LCDs is:

$$TC_D = 25 + 5 Q_D + Q_D^2.$$

where  $Q_D$  is the quantity of LCDs produced. Acme is divided into two subsidiaries: Acme Displays and Acme Calculators. Managers of each are told to maximize the profits of the subsidiary at which they work.

- a. If Acme cannot buy or sell LCDs, what is the optimal transfer price that Acme (headquarters) should set for LCDs? How many LCDs will Acme transfer internally? What would be the price of calculators? What will Acme's profits be? And how will they be divided between the two subsidiaries?
- b. Suppose now that Acme let the subsidiaries themselves set the price of their products. Under the same assumption that subsidiaries maximize profits, what are the prices they set for LCDs and calculators? What are the profits of each subsidiary? Explain briefly why the total profits of Acme are lower than in a).

### **Lecture 19: Asymmetric Information**

2. Problem #9, p.620 in *Pindyck & Rubinfeld (5<sup>th</sup> Ed)*, parts a, b, and c. **Note:** Consider whether Lew's will or will not match Harry's offers.

3. Decide whether each of the following three statements is **True**, **False**, or **Uncertain**, and give a brief but clear explanation why. (Note: these questions provide practice for the True, False, Uncertain section on the final exam)

**Lecture 15: Antitrust**

- a. For some years, Microsoft offered original equipment manufacturers (OEM's) a choice of methods of payment for operating system software. OEM's could either (1) buy the software for each machine on which it was installed at a very high price, or (2) contract on the basis of the numbers of machines sold, regardless of whose operating software was installed (a so-called "per-processor" contract). This practice is not anti-competitive.

**Lecture 16: Auctions**

- b. In a Dutch (descending price) auction for an object for which the bidders have independent and different valuations, participants should bid their true reservation prices.

**Lecture 18: Incentives & Information**

- c. Sloan is considering the addition of theft insurance for laptop computers as a part of annual School tuition. All students have laptops, and in the past an average of 5% of these computers has been stolen over the course of a year, at an average loss of \$2000 each. On the basis of that experience, the School is thinking of providing the insurance to all students and increasing the tuition by \$100. This is a good insurance policy. Among other things, it allows Sloan to break even.

**Lectures 15 & 18: Common Property & Incentives**

4. Consider two farmers and two pieces of land. We want to know what the effect is of each farmer working his own piece of land versus the farmers cooperating and jointly working on the two pieces of land. To simplify the exposition, we will denote these as 'independent farmers' and 'cooperative farmers' respectively.

Assume that each farmer (whether independent or cooperative) can decide on his own how much time to spend on farming. Let farmer  $i$ 's weekly time spent on farming be denoted  $h_i$  (in hours per week; so  $h_1$  for farmer 1 and  $h_2$  for farmer 2). The farmer's productivity (expressed in bushels of grain) is directly proportional to the time he spends on farming. In particular, an independent farmer produces  $80 h_i$  bushels of grain if he works  $h_i$  hours per week. Farmers in a cooperative are more productive since they can specialize: a cooperative farmer produces  $90 h_i$  bushels of grain if he works  $h_i$  hours per week. Cooperative farmers share the output of their farm equally. Let  $b_i$  be the bushels of grain that farmer  $i$  can take home at the end of the year, then  $b_i = 80h_i$  for an independent farmer, while  $b_i = (90 h_1 + 90 h_2)/2$  for a cooperative farmer.

Farmers dislike working and more so as they work more. In particular, farmer  $i$ 's utility is

$$u_i = b_i - \frac{h_i^2}{2}$$

We assume that a farmer  $i$  will choose  $h_i$  to maximize his utility  $u_i$ .

- a. Write out the utility functions of an independent farmer and a cooperative farmer completely in terms of  $h_1$  and  $h_2$ .
- b. How many hours will an independent farmer work (assuming that farmers choose  $h_i$  to maximize their utility)? What is his utility?
- c. How many hours will a cooperative farmer work? What is his utility?
- d. What is the problem with a cooperative farm? What would happen (qualitatively) if 100 farmers worked jointly in a cooperative farm? How could the farmers solve that problem?