

Homework 1

Due September 19, 2017

Homework will be collected at the end of the lecture on the day it is due. Submissions in any other time or manner will be ignored. The maximum score is 100. Unprofessionally looking papers or unnamed or unstapled sheets or improperly labelled questions or bad handwriting will result to a penalty up to 50% at the discretion of the grader. Plagiarism will be prosecuted and perpetrators will be executed.

1. Consider the following model of vertical relationship between a buyer and a seller. There are two period and the two parties can, if they wish, trade one unit of an indivisible good in period 2. Let v denote the value of the good to the buyer, c the production cost and p the trading price. Both c and v are commonly known at the beginning of period 2. The seller can invest in period 1 to increase the value of the good to the buyer (for instance, he can spend on R&D to increase the quality of the product). In particular, $v(I) = aI - bI^2$, where $a > 0$ and $b > 0$ are parameters. The level of investment I cannot be specified in a contract because it is not verifiable and therefore such contract would not be enforceable in court.
 - (a) What is the efficient level of investment, depending on the values of a , b and c ? [10 pts]
 - (b) In the absence of any contract, what is the level of investment chosen by the seller if the ex post surplus is to be divided equally between the two parties? Is this level necessarily inefficient? [10 pts]
 - (c) Suppose that the parties sign a contract which gives the seller the right to choose the trading price in period 2 (i.e. after the investment has been made). What will be the level of I chosen by the seller? Explain the intuition for your result. [10 pts]
 - (d) Alternatively, suppose that the parties sign a contract which gives the buyer the right to choose the trading price in period 2 (i.e. after the investment has been made). What will be the level of I chosen by the seller? What is your conclusion about who should have the power to decide the price in period 2? Explain the intuition for your result. [10 pts]
 - (e) Assume that $a = 3$, $b = 0.5$ and $c < 0.5$. How much will a seller be ready to pay the buyer to purchase the right to set $p = v$? Will the seller be ready to pay more or less for this right if c increases (but remains below 0.5)? Why? [10 pts]

2. A machine that is used by an ophthalmologist to perform surgery requires 2 special electrodes that cost \$500 each and they are good only for 20 operations. The machine is leased for a monthly fee. Also, each surgery necessitates other smaller costs such as gloves, x-rays, bandages etc.
 - (a) Analyze the cost structure for Lasik operations. [10 pts]
 - (b) Ophthalmologists do not usually come up with offers, sales and other promotions as cosmetic surgeons usually do. What does this say for the cost structure of Lasik surgeries? [10 pts]

3. Find the range of outputs for which the cost function $C(q) = f + cq^2$ is characterized by (i) economies of scale, (ii) diseconomies of scale, and (iii) constant economies to scale. Are there economies of scale if $f = 0$? [30 pts]