Guide to answers to Written Exam for the B.Sc. or M.Sc. in Economics
August 2011
Mikroøkonomi B
Final Exam

Problem 1

In Economic History, The Tragedy of The Commons is a well-known case of an inefficient use of resources.

- Explain, in terms of externalities, how the inefficiency arises, and what can be done to generate an efficient outcome

Answer: See Varian 34.6. The basic problem is that the marginal peasant will add another animal as long as the average product is higher than the marginal costs; this will cause the number of grazing animals to exceed the socially optimal point (marginal product equal to marginal costs). One solution is private ownership, dividing the commons into individual, privately owned land plots.

Problem 2

Consider the company DanishVoila specialized in translation of documents from Danish to Volapyk (the language of a far-away, small nation) and vice versa. The company, working from Denmark, employs translators living in Denmark who know both languages very well. DanishVoila realizes that it is the only employer who is in demand for such translators. The higher the salary for such translators, the more will want to work for the company (and the more translators it wants to employ, the higher salary it will have to pay).

At the same time, DanishVoila is the only translation company in the world with these skills, so it holds a monopoly position vis-á-vis the businesses in the two countries who are the potential customers. The demand for its translation services will, of course, depend negatively on the price it charges for its services.

- Which considerations should DanishVoila have when deciding the number of translators it wants to hire (wanting to maximize profit income to the company's owners)?
- What will happen to the salary of translators, compared to a situation with perfect competition? And to the price of translation services?

Answer: DanishVoila is a monopoly AND a monopsony. Hence, when hiring an additional translator, the marginal cost will be higher than the salary per translator (Varian 26.2). On the supply side, additional services will create a marginal revenue lower than the fee charged. Both these facts will, of course, tend to restrict the output, lower the salary for translators, and increase the translation service fee.

Problem 3

Consider an economy with two agents, Ann and Buster. Initially, Ann has an endowment of 5 units of the private good, and similarly Buster has 5 units. Ann's preferences can be represented by the utility function $u_A(G,x_A) = 2\cdot\ln(G) + x_A$, and Buster's preferences by $u_B(G,x_B) = \ln(G) + x_B$.
A public good can be produced, as one unit of the private good can be transformed into one unit of the public good. Each agent may choose to donate non-negative quantities of the private good for this purpose.

- If Buster donates nothing, how much will Ann want to donate?
- Given this donation from Ann, how much will Buster want to donate?
- Which quantity of the public good is efficient (Pareto-Optimal)?

Answer: The two first questions hint at the Nash equilibrium with A donating 2 units, and B donating 0 units. B, who would actually prefer to donate a negative quantity, were this possible, is a free-rider. The efficient quantity is 3.

Problem 4

Akerlof claimed that when a market is characterized by asymmetric information, the resulting market equilibrium may not generate an efficient allocation of the good traded, and furthermore that the income distribution may become different compared to the case of perfect information, too.

- Give a presentation of Akerlof's line of argument.

Answer: See Varian 37.1 Bad cars (lemons) decrease the average quality of cars supplied, hence lowering potential buyers' willingness to pay. This may result in inefficencies (some gains of trade being lost because owners of good cars cannot verify that their car has a high quality) as well as income distribution effects (sellers of bad cars receiving a price that is "too high", sellers of good cars receiving a price that is "too low").

Problem 5

A steel plant is situated by a lake used by a fisherman. Steel plant production is s, fish production is f, and the quantity of pollution being led into the lake by the steel plant, and decided by steel plant management, is x.
The cost functions are $c_s(s,x) = s^2 + (x-s)^2$ and $c_f(f,x) = f^2 + f\cdot x$. The steel plant sells its steel output on a perfect competition market, and the market price of steel is 8. Similarly, fish is sold at the market price 6.

- Identify the profit-maximizing production levels for the two producers, the level of pollution chosen by the steel plant, and the profits obtained by each producer, when they act individually
- Verify that if the two producers were jointly owned, this owner would choose s = 3 and f = 2
- Identify the level of pollution chosen by a joint owner and the maximum level of profits obtained
- Now, assume again that there is separate ownership, and imagine you are to implement an optimal tax on pollution in this case. Identify the right level for this Pigou tax.

Answer: With individual ownership, s = 4, x = 4, f = 1, and profits are 16 (steel) and 1 (fish). With joint ownership, the following three values satisfy the three FOC's for aggregate profit maximization: s = 3, f = 2, x = 2, and profits will be 18 > 16 +1. The Pigou tax is 2.

Problem 6

A catering firm Cater King has two kitchen units. Kitchen 1 has the cost function $C_1(y_1) = \frac{1}{2}y_1^2$, where y_1 is the number of meals produced. Kitchen 2 has the cost function $C_2(y_2) = y_2^2$, where y_2 is the number of meals produced. Cater King has, locally, a monopoly, facing the demand curve $D(p) = 480 - p$, with p being the price of a meal.

- How many meals should be produced in each of the kitchen units?
- How large is the mark-up of the price over the marginal costs, percentage-wise?

Answer: One needs to add, horizontally, the two inverse MC-curves to obtain the aggregate inverse MC-curve, yielding that MC(y) = (2/3)y. Setting MC equal to MR, one finds y = 180, MC = 120 with $y_1 = 120$, $y_2 = 60$. *With p = 300, the mark-up is 150 percent.*