Final Exam

5.3.2013

1. General information:

a. Make sure that your final exam is complete. The final exam consists of 4 problems.
b. Only use the provided sheet of paper. Write your matriculation number immediately and clearly on each page!
c. Please do not remove the staples from the provided sheet of paper.
d. Allowed items at your workplace: Student ID, writing utensils (no red pen, no ink eraser, no pencil case), ruler, set square, non programmable calculator, food and drinks.
e. Use a permanent pen (no pencil).
f. Mobile phones have to be turned off and removed from your place!

2. Hints about doing the exam:

a. Read each task carefully. The tasks could be extended over several pages.
b. Please work on all tasks and state each on a new page. Please write your answers in a readable way.
c. You may write your answers in English or in German.
d. Label the axes of your illustrations.
e. The exam lasts 90 minutes!

We wish you every success!

Problem 1.

A monopolist with marginal costs of zero serves two types of consumers. There are 30 type 1 consumers and 10 type 2 consumers. The marginal willingness to pay for x units of the good is p = 10 – x for type 1 and p = 20 – x for type 2 consumers. The monopolist knows that there are two types, but he does not know the type of a given consumer.

a) Derive the aggregate demand function.
b) What is the optimal linear price of a monopolist? Will the monopolist serve both types?
c) What is the optimal two-part tariff if the monopolist serves only one (Which?) type?
d) What is the optimal two-part tariff if the monopolist must serve both types, but can only charge one tariff? Would the monopolist serve both types if she is free to choose?
e) Calculate the optimum packages if the monopolist engages in second-degree price discrimination. Which constraints does the monopolist have to take into account?

Problem 2.

Consider a market for a homogeneous good with the inverse demand function $p = B - b\,x$ with the price p, the quantity x, and the positive parameters B and b. There are two potential competitors in the market, Firm 1 and Firm 2. The initial constant marginal costs are c_1 and c_2. Assume $c_1 \leq c_2$

a. Determine the equilibrium quantities, the equilibrium price and equilibrium profits if both firms compete in quantities (Cournot competition).
b. Determine the respective values if both firms compete in prices (Bertrand competition).
c. Assume that $B = 30, b = 1, c_1 = c_2 = 6$. Furthermore, assume that firm 1 comes up with an idea for a new production process allowing production at a constant marginal cost c_1 = 3.
    i. Assume Cournot competition: What are the maximum costs for the implementation of this new process so that the firm still invests in this new technology?
    ii. Calculate the respective value for Bertrand competition.
    iii. Based on these results, comment briefly on the relation between market power, competition, and innovation.

Problem 3.

Discuss the various dimensions along which firms might differentiate their products. How will these choices typically diverge from the social optimal ones? Discuss the relation between product differentiation and competition.

Problem 4.

Firm *Q* & *R* has developed a new wrinkle cream. Suppose that the demand for this product is given by the nonlinear demand function $Q(P,A) = P^{-2}A^{1/5}$, where *Q* denotes quantity demanded, *P* the price and *A* the level of advertising, e.g. the number of ads. Assume that total costs of advertising are *t A,* so that an ad costs *t*. Total production costs are *c Q.*

a) Derive the price elasticity of demand η_P and the advertising elasticity of demand η_A.
b) Derive *Q* & *R*'s optimality conditions for both its price and the level of advertising.
c) What do you predict the advertising-to-sale ratio, i.e. the ratio of advertising expenditure to total revenues, would be in this industry? Does it depend on how costly it is to advertise for this product? How should one interpret this relation?
d) Briefly comment on what would happen if the demand function were $Q(P,A) = P^{-2}A^{3}$.