

**Examination:** Economics IV (Economic Policy)

**Exam Number:** 5026

**Examiner:** Dr. Th. Riechmann

Winter Semester 2007/08

**Date:** February 2<sup>nd</sup>, 2008

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Name, First Name

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Student Number

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Study Program and Semester

**Remarks**

1. The following aids can be used: dictionary, calculator according to the examination office's list.
2. The exam consists of three main problems and five multiple choice questions. **All** questions and problems have to be answered.
3. Total available time is **120 minutes**.
4. Please write readable and **only into the given boxes**.

**Good luck!**

**Problem 1 (35 points):**

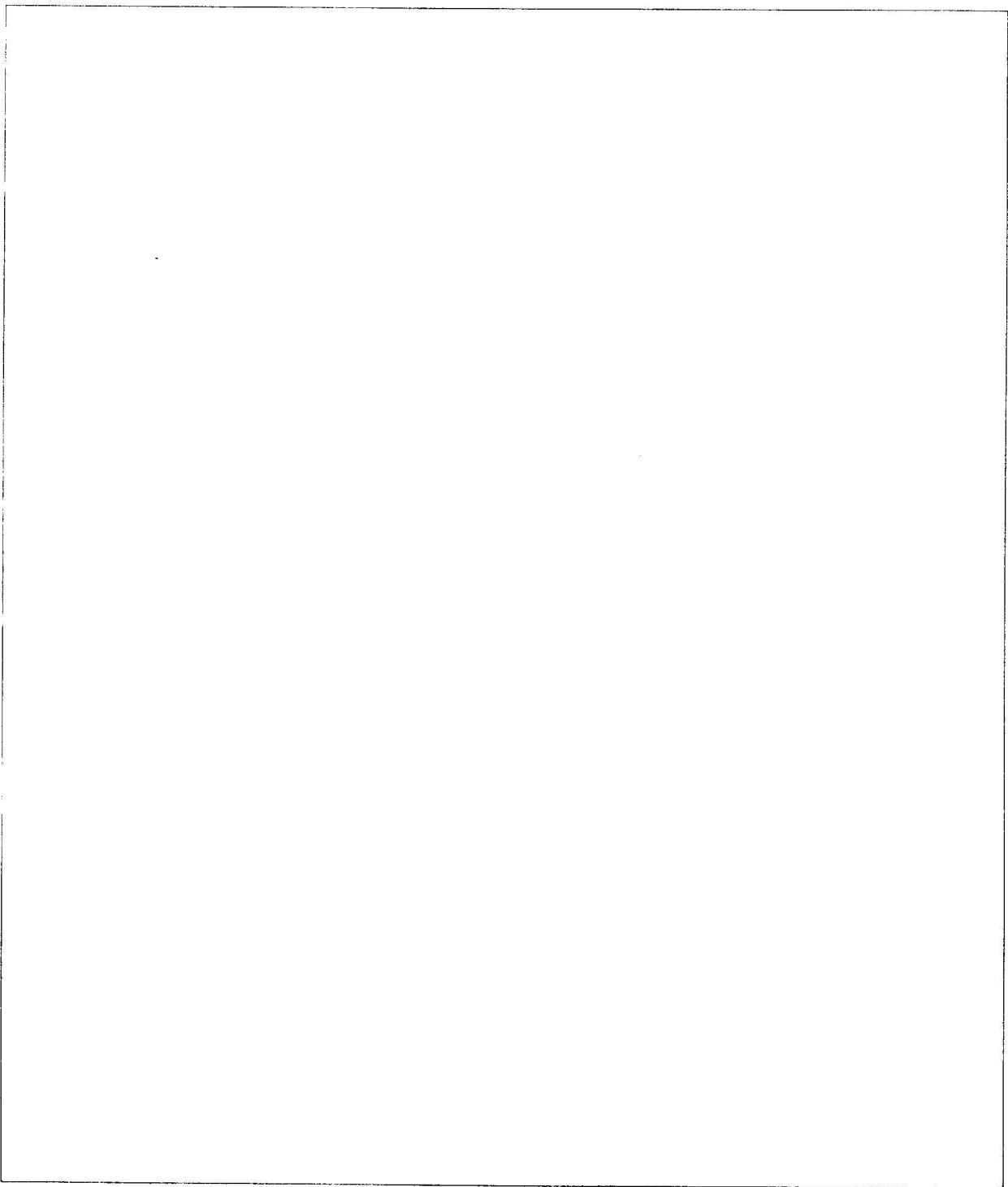
A plant for pharmaceuticals and a research center for mechanical engineering are the only two companies in a small town. The pharmaceutical company produces a drug for children with attention deficit disorder. The pharmaceutical company can sell each ton of pills of the drug for a market price of  $p_D=20$ . The company faces production costs of  $C_D(q_D)=(1/3)q_D^2-10q_D$ , where  $q_D$  gives the number of tons of pills produced. During the production of the pills the pharmaceutical company disposes some amount of the drug into the air. This amount is given by  $A=4q_D$ . The research center produces engineering patents it can sell at a market price of  $p_E=130$ . Its costs increase with the amount of chemicals in the air because brain activity of its researchers is slowed (the pharmaceutical company has a fully automatic production and no employees). The research center's cost function is given by  $C_E(q_E)=10q_E^2+A$ .

- a. What is the economic problem in the situation above?

- b. If each company maximizes its own profit individually, how big is each company's profit? How many tons of pills and how many patents are produced?

- c. What would be the efficient production levels under joint profit maximization? By how much would total welfare increase?

d. Now assume that the research center tries to strike a deal with the pharmaceutical company to reduce the amount of pills to the efficient level. How much would the research center be willing to pay at the most? How much will the pharmaceutical company demand at least? Ignore your previous answers and assume that the research center always produces 5 patents. Assume also that the pharmaceutical company would produce 27 tons of pills under joint profit maximization and produces 54 tons when maximizing individually.



- e. According to the Coase Theorem negotiations between the companies could lead to an efficient outcome. Name two of the assumptions of the theorem.

- f. Unfortunately both companies could not agree on a deal. Now the mayor of the town wants to introduce a tax on the production of the pills. How big must a unit tax be to induce an efficient production level of pills? How big would the tax revenues be? (Use the values from question d).

**Problem 3 (35 points):**

Peter and Kathy are living together, but they are not married. Peter has a gross labour income of € 60 (  $Y_p = 60$  ) while Kathy is unemployed.

The tax tariff is given by:

$$T(y) = \frac{y^2}{100} \quad \forall y \in [0, 100]$$

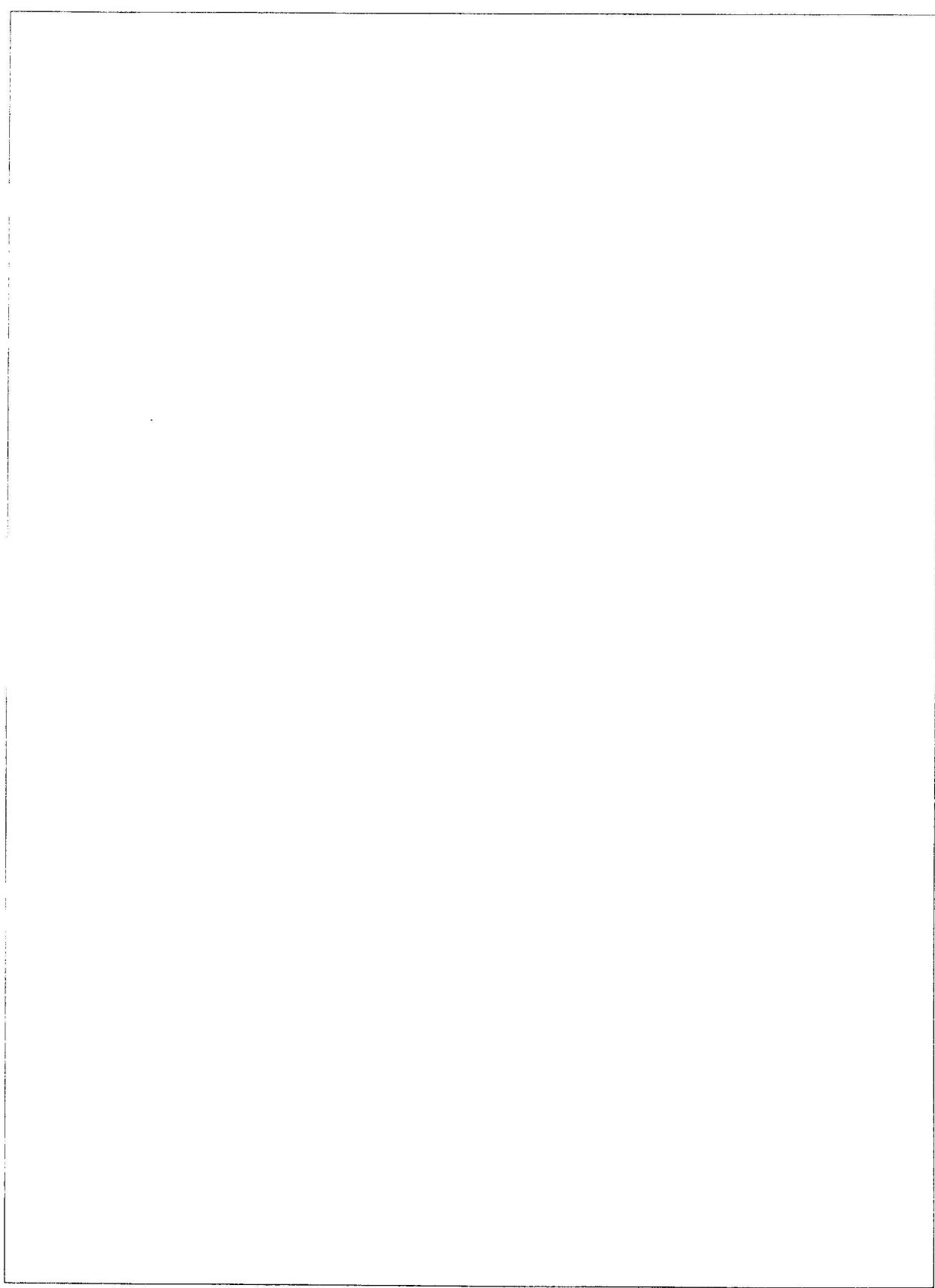
- a. Is the tax tariff progressive, linear or regressive?

- b. Compute Peter's average and marginal tax rate.

c. Now Peter and Kathy marry. The tax regime grants married couples a splitting advantage. How high is the splitting advantage for the couple, given the above specified incomes?

d. Assume that Kathy is now offered a job with a gross wage of € 20. But - as she hates to go to work – she will only do so if the household's net income is raised by at least € 10. Will she accept that job offer?

e. Assume the Finance Minister asks you, whether the tax system is optimal. What would you answer and why? A graph may be useful.





- f. Can you tell the Finance Minister a taxation rule, which she should follow as a principle? The Finance Minister is not an economist, so please explain the advantages of that rule and its basic properties.

### Multiple Choice Problems (5 Points each)

There is one correct answer to each question. Only one answer per question.

1. Which of the following statements about allocations given by the contract curve of an Edgeworth-Box is true?

A	There is no way to make one person better off.
B	Both persons consume amounts equal to their initial endowments.
C	There is no possibility for mutually advantageous trades.
D	The slope of the contract curve is given by the price ratio.

2. Which of the following statements with regard to public goods is true?

A	Public goods are only supplied by the government.
B	If the supply of a public good is determined by majority vote, then the outcome must be Pareto-efficient.
C	If a public good is provided by voluntary contributions, too little will be supplied relative to the efficient level.
D	If preferences are single-peaked, then everyone will agree about the right amount of public goods to be supplied.

3. There are four consumers of a public good  $G$  which has a marginal cost of 100. The four consumers all have the same demand function for the public good given by  $D_i(p) = 150 - 2p$ , where  $p$  is the price for one unit of the public good. What is the optimal level of provision of the public good?

A	62.5
B	100
C	112.5
D	400

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4. With respect to question 3: What is the loss in consumer surplus if all consumers decide on the provision of the public good privately?

A	10 000
B	15 625
C	40 000
D	None of the above

5. What does the First Theorem of Welfare Economics imply?

A	Every market equilibrium is Pareto-efficient.
B	The welfare optimum is characterized by maximal consumer surplus.
C	The welfare optimum is unique.
D	The competitive market equilibrium is always fair.

6. Individually rational behaviour always leads to a collectively rational outcome...

A	...only in the absence of external effects.
B	...as proven by Arrow.
C	...as stated by the Second Theorem of Welfare Economics.
D	...only by situations that can be characterized by the Prisoner's Dilemma.