Remark: The exam consists of four questions and all questions have to be answered. Total available time is 120 minutes. A dictionary as well as a calculator (fulfilling the requirements of the examination office) can be used.

Question 1 (30 points)

Suppose that a large number of people live near a lake. If it is profitable for them, they take their boats and go out to fish. The total number of fish caught is denoted by F and depends on the number of fisher boats on the lake. This relationship is captured by the function $F = 14x - 0.25x^2$ where x denotes the number of boats. It is assumed that the cost of fishing is 0 for each fisher and that each fisher uses his own boat. Each fish caught is sold on the market and the price for one fish is 2.

a) Give the two criteria for categorize goods. Characterize the four different types of goods according to these criteria. Which type of good is present in this fisher example?

b) What is the socially optimal number of fishing boats on the lake?

c) How many boats will be on the lake if there are no access restrictions for fishing?

d) Explain briefly the problem that occurs in part c)? Briefly discuss how the government can overcome this problem. What issue may arise with any government solution?

Question 2 (30 points)

A monopolist's market demand for a good y is given by the function $D(y) = 100 - 2p$ and its cost function is $c(y) = 10y$.

a) What would be the efficient market price and quantity? Derive the consumer and producer surplus at this price and quantity. Under which type of market structure would you expect this outcome?

b) What would be the price and quantity in the case of a monopolist? Derive the consumer and producer surplus at the monopoly price and quantity and the deadweight loss compared to the efficient outcome. Show the deadweight loss graphically on a diagram with price on the vertical and quantity on the horizontal axis.

c) The government would like the monopolist to produce the efficient level of y. In order to do this it will pay the monopolist a subsidy s per unit sold. At what level would the subsidy have to be for the monopolist to produce the efficient y? What would be the monopolist price at this y?

Question 3 (30 points)

Three individuals are deciding over the provision of a public good which costs 1200 Euros. The cost will be divided equally between the three individuals. The decision on whether or not to provide the good will is made using the Clark-Groves mechanism.

a) If the willingness to pay of individual 1 is 500, the willingness to pay of individual 2 is 500 and the willingness to pay of individual 3 is 100 will the good be provided or not? Who, if anyone, pays the Clarke-Groves tax and how much would it be?

b) If the willingness to pay of individual 1 is 800, the willingness to pay of individual 2 is 500 and the willingness to pay of individual 3 is 100 will the good be provided? Who, if anyone, pays the Clarke-Groves tax and how much would it be?

c) If the willingness to pay of individual 1 is 600, the willingness to pay of individual 2 is 600 and the willingness to pay of individual 3 is 100 will the good be provided? Who, if anyone, pays the Clarke-Groves tax and how much would it be?

d) If the willingness to pay of individual 1 is 500, the willingness to pay of individual 2 is 500 and the willingness to pay of individual 3 is 500 will the good be provided? Who, if anyone, pays the Clarke-Groves tax and how much would it be?

Question 4 (30 points)

Consider an economy with two individuals A and B who benefit from the consumption of two goods X and Y. Both individuals have the same Cobb-Douglas utility function.

a) Represent this economy in an Edgeworth-box showing where one of the optimal solutions occurs. What condition characterizes this optimum? Explain briefly the intuition of the condition for an optimum. How many optima would you expect the Edgeworth-box to have? Show this in your diagram.

b) Assume that the good X is a private good and good Y is the number of rights to use air. Both individuals benefit from both goods, but they use the rights for air differently. Individual A uses the rights for air to smoke cigars and individual B uses the rights to have clean air. Suppose that both individuals have the same quantity of good X, but individual A has all rights to use air. Show this situation in a (new) Edgeworth-box and denote this as point P. Why is this situation not efficient? Show a possible optimal solution for this problem and denote this as point Q. Discuss how this optimal solution can be achieved and why efficiency is achieved at this point. What has changed in point Q compared to point P?

c) Repeat part b) for the case that individual B has all rights to use air. Please draw a new Edgeworth-box.

d) Explain briefly how are part b) and c) related to the Coase theorem.