Stockholm University

Department of Economics

Course name:	**Intermediate microeconomics**
Course code:	**EC2101**
Type of exam:	**Main**
Examiner:	**Lars Vahtrik**
Number of credits:	**7,5 credits**
Date of exam:	**Sunday 6 October 2019**
Examination time:	**5 hours (09:00-14:00)**

Write your identification number on each answer sheet (the number stated in the upper right hand corner on your exam cover).

Explain notions/concepts and symbols. If you think that a question is vaguely formulated, specify the conditions used for solving it. Only legible exams will be marked. **No aids are allowed.**

The exam consists of 5 questions. Question 1 is worth 15 points. Questions 2-4 are worth 25 points each and question 5 is worth 10 points. The maximum score on the exam is 100 points in total. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.
If you have the course credit you do not answer question 5.

Your results will be made available on your Ladok account (www.student.ladok.se) within 15 working days from the date of the examination.

Good luck!

Question 1

Kim has the utility function $U(x_1, x_2) = x_1^{\frac{1}{4}} x_2^{\frac{3}{4}}$. Set up Kim's maximization problem and derive expressions for the Marshallian demands for goods x_1 and x_2 .
Can you say anything about the share of income that Kim spends on good x_1 and x_2 ? How will this share change with changes in prices p_1 and p_2 . **(15p)**

Question 2

Consider a market with 2 firms where the inverse demand function is given by $p = 56 - 2q$, where $q = q_1 + q_2$. Each firm has a cost function given by $c(q_i) = 8q_i$, where $i = \{1,2\}$.

a) Compare price level, quantities and profits in this market calculating the Cournot equilibrium and the Stackelberg equilibrium. Draw a graph with best response functions and illustrate the Cournot and Stackelberg solutions in the graph. **(15p)**

b) Compare your results regarding price level, quantities and profits in **a)** to the result under perfect competition and collusion (monopoly) respectively and illustrate these solutions in your graph. **(10p)**

Question 3

a) A steel mill is producing steel, s , while creating a negative externality, x , affecting two downstream fisheries negatively. The steel is sold in a competetive market at a price of $p_s = 400$. The steel mill's cost function is given by $c_s = 20s^2 + 2x^2 - 24x$ so that the externality reduces cost up to a point. The fisheries produce fish, $f = f_1 + f_2$, sold in a competitive market at price $p_f = 200$. The two fisheries have cost functions $c_{f1} = 10f_1^2 + 4x$ and $c_{f2} = 10f_2^2 + 4x$. Set up the profit maximization problem for a social optimum and derive optimal s , f and x under the assumption that both fisheries will produce the same amount of fish in optimum. What amount of x will the steel mill produce if it maximizes it's own profits? **(20p)**

b) Show that the reduction of the externality can be interpreted as a public good in the problem above by reinterpreting the relevant first order condition. **(5p)**

Question 4

a) A monopoly has the inverse demand function $P=200-Q$ and the cost function $C=40Q$. Set up the profit maximization problem and solve for the profit-maximizing price and quantity. How much will the monopoly raise the price if it faces a quantity tax, $t=40$? Show the (additional) welfare loss of the tax in a graph. **(15p)**

b) Instead of using a quantity tax of $t=40$, the government contemplates a proportional tax on profits, $\tau=\frac{3}{8}$. Compare tax revenue and welfare effects under this two different tax schemes and make a policy recommendation to the government based on your findings. **(5p)**

c) The result you derived in **a)** leads to the conclusion that a monopolist always passes on a fraction of the tax as an increase in consumer price. Find out if this statement is true for all demand functions by analyzing the effects of a tax of $t=40$ when the monopoly faces the constant elasticity, inverse demand function $P=Q^{-\frac{1}{2}}$ and cost function $C=40Q$. **(5p)**

Question 5

Let us revisit question 1 assuming that we have two types of consumers in the economy represented by Kim and Robin. The first type is Kim's type with utility function $U(x_1,x_2)=x_1^{\frac{1}{4}}x_2^{\frac{3}{4}}$ and the second type is Robin's type with utility function $U(x_1,x_2)=x_1^{\frac{3}{4}}x_2^{\frac{1}{4}}$. Discuss what will happen with the amount x_1 and x_2 consumed if we transfer income from consumers of Kim's type to consumers of Robin's type under the assumption that prices, p_1 and p_2, remain constant. Is it likely that prices will remain constant in a competitive equilibrium? **(10p)**