Department of Economics

Course name:	**Intermediate Microeconomics**
Course code:	**EC2101**
Type of exam:	**Retake**
Examiner:	**Hans Wijkander**
Number of credits:	**7,5 credits**
Date of exam:	**10th of December, 2016**
Examination time:	**09.00-14.00**

Write your identification number on each answer sheet. Use the printed answer sheets for all your answers. Do not answer more than one question on each answer sheet.

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 4 main questions. There are five sub-questions pertaining to question 4. The sub-questions should <u>only</u> be answered by students who have not received an extra credit.

Questions 1-4 are worth 25 points each (question 4: 15 points plus the extra sub-questions worth 10 points). The maximum score is 100 points. *Indicative* scale: E ~ 45 points are required, for D ~ 50 points, C ~ 60 points, B ~ 75 points and A ~ 90 points.

Your results will be available on your "My Studies" account **(**www.mitt.su.se**)** on the 2nd of January at the latest.

Good luck!

1. Joe's utility is determined by the number of hours he has of free time (leisure), F, and consumption of commodities, C. He has 16 hours per day to divide between free time and work time (labor). Every hour he works, he earns the wage w and the price of commodities is 1. Joe's utility from leisure and commodity consumption is: $u = FC$.

a) Write the Lagrange function for Joe's maximization problem. (5 points)

b) Derive Joe's optimal choices of free time and consumption goods. (5 points)

c) Draw a graph of your results in b) with free time and consumption on the axes. (5 points)

d) Write an equation for Joe's supply of labor. (5 points)

e) What type of good (inferior, normal or superior) is leisure in Joe's preferences? Motivate your answer! (5 points)

2. Antonia is a wealthy woman. She is interested in investing some of her wealth in a bond that yields a net return of x SEK per year. Antonia lives in a very simple economy where the interest rate, r, where $0 < r < 1$, is always the same.

   a) What is the present value of the net return, if the bond is valid for one year only, i.e. if Antonia gets a net return of x SEK after one year? (5 points)
   b) Let the bond instead yield the same net return, x SEK, per year, but for an infinite number of years into the future. As this bond yields an infinite amount of future payoffs, its present value can be expressed as an infinite sum. Write an equation for the present value of this sum as a function of x and r. (5 points)
   c) Solve for a simpler expression of the present value in b), i.e. the present value not expressed as an infinite sum but as a simple function of x and r. Give a short interpretation of this expression. (5 points)

Antonia could instead invest money in the stock market. There are many different stocks on the market. The average expected rate of return on the market is $\mu_m > 0$ and the average market risk is $\sigma_m > 0$ (where σ is a risk measure).

   d) Antonia really likes the firm "Ax:son AB" and would like to invest in some of its stocks. This asset has expected rate of return μ_i. Its risk in relation to the rest of the market is given by the factor β_i, where $\beta_i = 1$ if the asset is exactly as risky as the market average, $\beta_i > 1$ if it is more risky and $\beta_i < 1$ if it is less risky. Give a short motivation to why the total risk in this asset can be expressed by: $\sigma_m \beta_i$. Use this expression for the stock's total risk to calculate the risk-adjusted rate of return of this stock if the market cost of risk is: $\frac{\mu_m - \mu_f}{\sigma_m} > 0$, where μ_f is the risk-free rate of return. (5 points)

e) In equilibrium, two different stocks have the same risk-adjusted rate of return. Motivate why this is the case. (5 points)

Question 3 must be answered in English.

3. Peter and Linda argue over what to do over the weekend. Both know that they want to spend the weekend together, but they cannot agree over what to do. Peter prefers to go watch a football match, whereas Linda wants to go to the opera. Since the couple wants to spend time together, they will receive no utility if they go separate ways. If they go either to the opera or to a football match, both will receive some utility from the fact that they're together, but one of them will enjoy the activity more.

The normal form of the game above is given below:

		Linda	
		Football	Opera
Peter	Football	3,1	0,0
	Opera	0,0	1,3

a) Find all pure Nash equilibriums (5 points).

b) Imagine now that Linda has a clear preference for Opera even if Peter doesn't follow her. The normal form of the game becomes:

		Linda	
		Football	Opera
Peter	Football	3,1	0,2
	Opera	0,0	1,3

Do any of the players have a dominant strategy? If Yes, which one? Find all the Nash equilibriums (5 points).

c) Imagine that Linda and Peter got into a fight and prefer to avoid each other. Peter and Linda get a utility of zero if they go the same activity and get a positive utility otherwise. Peter has a preference for football and Linda has a preference for Opera. The normal form of the game becomes:

<table>
<tr><td></td><td></td><td colspan="2" align="center">*Linda*</td></tr>
<tr><td></td><td></td><td>*Football*</td><td>*Opera*</td></tr>
<tr><td rowspan="2">*Peter*</td><td>*Football*</td><td>0,0</td><td>2,2</td></tr>
<tr><td>*Opera*</td><td>1,1</td><td>0,0</td></tr>
</table>

Find all the Nash equilibriums (5 points).

d) Imagine that Linda gets upset with Peter and wants to avoid him while Peter prefers to meet her. The normal form of the game becomes:

<table>
<tr><td></td><td></td><td colspan="2" align="center">*Linda*</td></tr>
<tr><td></td><td></td><td>*Football*</td><td>*Opera*</td></tr>
<tr><td rowspan="2">*Peter*</td><td>*Football*</td><td>3,0</td><td>0,3</td></tr>
<tr><td>*Opera*</td><td>0,1</td><td>1,0</td></tr>
</table>

Is there a Nash equilibrium in pure strategies? Find all Nash equilibriums (5 points).

e) Reconsider the payoff in a) (above) and imagine that Peter (or Linda) can buy tickets to one of the events. The person who buys tickets first, gets to decide which event to go to since the other would rather follow along. Assume that Peter and Linda can't buy tickets at the same time and that Peter buys tickets first. Draw the extensive form game of the game in a) and find the subgame perfect equilibrium. Which event will Peter choose in equilibrium? (5 points)

4. A mutual insurance company, i.e., it is owned by its clients and makes no profit, insures bicycles. Bicycles are exposed to a risk of getting stolen. The owners want to buy insurance against bicycle theft and that they do from the mutual insurance company. Bicycle owners are identical when it comes to wealth, the value of the bicycle they own and how much they dislike engaging in activities that potentially reduce the risk for getting their bicycle stolen. The insurance company insures a large number of bicycles implying that there is in practice no uncertainty about the fraction of bicycles stolen.

Assume first that the probability of getting a bicycle stolen is exogenous, that is, the owner can do nothing to reduce the risk of theft.

a) How much insurance would be optimal that the insurance company provides (full insurance or partial insurance)? Motivate your answer. (5 points)

Assume now that the bicycle owners can reduce the risk of bicycle theft by engaging in risk reducing activities and that the insurance company can observe the bicycle owners' effort to reduce risk.

b) Explain how the contract will be between bicycle owners and insurance company in this situation. How much (no numbers required) insurance will bicycle owners get? (5 points)

Consider now again the situation where bicycle owners can affect the risk of bicycle theft but the insurance company cannot observe effort taken by bicycle owners to reduce the risk for theft. The insurance company knows how the risk for theft is affected by effort to reduce risk.

c) Explain how the insurance company decides about premiums and reimbursement in this situation. (5 points)
    Subquestions d–h should be answered only if you have NOT received credit from assignments.

d) State the Slutsky equation and explain the different components (terms) in it. (2 points)
e) The First Welfare Theorem establishes a relation between competitive equilibriums and Pareto efficient allocations. Are all competitive equilibriums Pareto-efficient. (2 points)
f) A monopoly maximizes profit at the output quantity where marginal cost equals marginal revenue. Can a situation where an increase in the quantity sold by 1% requires a decrease in the price by more than 1% be an equilibrium? (2 points)
g) What is meant with a Public Good (sometimes also called Collective Good)? (2 points)
h) Consider an equilibrium in a Prisoners' dilemma game, played once. If instead the game is played 10 times, are the equilibriums the same each time the game is played? Motivate your answer. (2 points)