## i Candidate instructions

## ECON4240

This is some important information about the postponed exam in ECON4240. Please read this carefully before you start answering the exam.

Date of exam: Friday, October 4, 2019
Time for exam: 09.00-12.00 (3 hours)
The problem set: The problem set consists of three problems. They count as indicated. Start by reading through the whole exam, and make sure that you allocate time to answering problems you find easy. Note: There is a total of 48 points on this exam.

Sketches: You may use sketches on all questions. You are to use the sketching sheets handed to you. You can use more than one sketching sheet per question. See instructions for filling out sketching sheets on your desk. It is very important that you make sure to allocate time to fill in the headings (the code for each problem, candidate number, course code, date etc.) on the sheets that you will use to add to your answer. You will find the code for each problem under the problem text. You will NOT be given extra time to fill out the "general information" on the sketching.

Access: You will not have access to your exam right after submission. The reason is that the sketches with equations and graphs must be scanned in to your exam. You will have access to your exam in week 42.

Resources allowed: No written or printed resources - or calculator - is allowed (except if you have been granted use of a dictionary from the Faculty of Social Sciences).

Grading: The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.
Grades are given: 25 October 2019

## 1 Problem 1

Problem 1 (4 points)

Define a Walrasian equlibrium and state the second welfare theorem of economics.

Fill in your answer here and/or on sketching paper

## 2 Problem 2

## Problem 2 (20 points)

Each sub-question is given equal weight.

Please answer this problem on paper.
Two agents, denoted $a$ and $b$, live in a 2-commodity exchange economy and have the following utility functions:

$$
\begin{aligned}
U\left(x_{a}, y_{a}\right) & =x_{a} y_{a} \\
U\left(x_{b}, y_{b}\right) & =\alpha x_{b}-\beta x_{b}^{2}+y_{b}
\end{aligned}
$$

Initial endowments are $w_{a}=\left(1, \frac{1}{2}\right)$ and $w_{b}=\left(1, \frac{3}{2}\right)$. All agents are price takers. Please normalize the price for good $y$ to unity.
i) Assume $\alpha, \beta>0$. Derive the Walrasian aggregate demand for good $x$ as a function of price $p_{x}$ and individual wealth levels $m_{i}, i \in\{a, b\}$.
ii) What is the aggregate demand for good $x$ as a function of only the price $p_{x}$ ?
iii) Assume that $\alpha=6$ and $\beta=2$. What are the equilibrium allocation of good $x$ and the equilibrium price?
iv) Assume that $\alpha=2$ and $\beta=0$. What is individual $a$ 's Walrasian demand for good $x$ ?
v) Assume that $\alpha=2$ and $\beta=0$. What are the equilibrium allocation of good $x$ and the equilibrium price?

Fill in your answer here and/or on sketching paper

Maximum marks: 0

## 3 Problem 3

Information assymmetries in Town (24 points)
Each sub-question is given equal weight

In a city called Town, there are two kinds of workers, Tillies and Rullies. The labor of Tillies is worth 1000 dollars per month; the labor of Rullies is worth 2500 dollars per month. There are exactly twice as many Tillies as Rullies in Town. Tullies look just like Rullies and are accomplished liars. If you ask, they would claim to be Rullies. Rullies always tell the truth. Monitoring individual work results is not possible, so everyone was paid the same wage.
a) If labor markets were competitive, what would be this wage?

Fill in your answer here and/or on sketching paper

A professor who loves to talk offered to give a free lecture, once a month, on macroeconomics to the employees of a small firm. These lectures have no effect on productivity, but both Tillies and Rullies find them excruciatingly dull. To a Tilli, each hour of lecture is as bad as losing 100 dollars. To a Rulli, each lecture is as bad as losing 50 dollars. Suppose that the firm gives each of its employees a pay raise of 55 dollars per month, but insisted that they attend the professor's lectures.
b) What would happen to the firm's labor force?
$\qquad$
c) What would happen to the average productivity of the firm's employees?

## Fill in your answer here and/or on sketching paper

$\square$
Other firms noticed that those who had listened to the professor's lectures were more productive than those who had not. So they tried to bid them away from their original employer.
d) How much were their wages bid up to?

Fill in your answer here and/or on sketching paper

After observing the "effect of his lectures on labor productivity" the professor decided to expand his efforts. He found a huge auditorium where he could lecture to all the workers in Town who would listen to him.
e) If employers believed that listening to the professor's lectures improved productivity by the improvement in productivity in the first small firm and offered bonuses for attending the lectures accordingly, who would attend the lectures?
Fill in your answer here and/or on sketching paper
$\square$
f) Having observed this outcome, how much of a wage premium would firms pay for those who had attended the professor's lectures?
Fill in your answer here and/or on sketching paper

The professor was disappointed by the results of his big lecture and decided that if he gave more lectures per month, his pupils might "learn more". So he decided to give a course of lectures for 20 hours a month.
g) Would there now be an equilibrium in which the Rullies all took his course and none of the Tullies took it and where those who took the course were paid according to their true productivity?

Fill in your answer here and/or on sketching paper
$\square$
h) What is the smallest number of hours the professor could lecture and still mantain a separating equilibrium?

Fill in your answer here and/or on sketching paper

Maximum marks: 0

