

Written Exam for the B.Sc. in Economics summer 2014

Microeconomics A

Final Exam

07/08/2014

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

This exam question consists of 3 pages in total

Problem 1

Consider Laila that among many other goods and services enjoys leisure when she does not work. She earns a rate of w as an after-tax wage and can buy a composite consumption good at the price of p .

Laila has preferences representable by a quasi-linear utility function of the form $u(f, x) = v(f) + x$ where f is the amount of leisure enjoyed and x the amount of the composite consumption good, while the function $v(\cdot)$ is a differentiable, strictly increasing and concave function.

Laila can work no more than \bar{L} hours and has no endowment of consumption goods initially.

Consider a pair of prices (\bar{p}, \bar{w}) such that the choice of Laila, $(f(\bar{w}, \bar{p}), x(\bar{w}, \bar{p}))$, when maximizing utility, is in the interior of the consumption space, which is \mathbb{R}_+^2 and $f(\bar{w}, \bar{p}) < \bar{L}$.

Can we observe that Laila will work less when the wage rate increases (by a small amount)?

Problem 2

Each month Henning receives dkk 500 from his disability pension, after having been declared unable to work as a consequence of a working accident. Henning consumes, among many other things, Havanna cigars directly imported, which can be acquired at the price of $p_1 = \text{dkk } 10$ pr cigar.

His preferences are representable by a utility function

$$u(x_1, x_2) = 20 \ln x_1 + 2x_2$$

where x_2 is the consumption of other goods. The price of other goods is normalized to unity, e.g. $p_2 = 1$.

As part of a program to favor former colonies the European Union imposes a tax duty on Havanna Cigars, which means that the price of Havana Cigars rises to dkk 20.

- a) Find the minimal amount with which Henning should be compensated to be as well off as before the tax duty.

Assume that the government, in order to compensate Henning, pays him the tax revenue collected from his import of cigars.

- b) What should the compensation be? Is Henning as happy as before the tax levied and the compensation? Explain.

Problem 3

Consider the construction firm Digger A/S which sells construction services when building houses. The firm uses a technology given by the production function

$$f(\ell, k) = (\min\{\ell, 2k\})^{\frac{1}{2}}$$

where ℓ is the labour input and k is the number of digging machines. The output is measured as the amount of “cubic-meters hole”.

Suppose that the firm can be hired at a price of $p = 10$ per cubic-meter hole, the going wage rate is $w = 2$ while the rental rate of digging machines is $r = 1$. Digger A/S is only a small firm in the industry and thus takes the prices on output and input as given.

- Determine the cost function of the firm as a function of output
- How many cubic-meters of holes maximize the profit of the firm? What is the profit of the firm?
- If the price of holes increases to $p' = 15$, how does this impact the production and profits?
- If the rental rate increases to $r' = 2$ (with output price $p = 10$), how does this impact the production and profits of the firm.
- Consider the impact on the labour and capital demand of the firm in c) and d) compared to b). Explain the result.

Problem 4

Comment on the following statement:

“In any Pareto efficient allocation the marginal rates of substitution between any two goods must be equal between any two consumers.”

Problem 5

Consider a Koopman economy with a single (representative) consumer with preferences representable by a utility function

$$u(f, x) = f \cdot x$$

and he has at his disposal a production technology given by

$$f(\ell) = \max\{0, \sqrt{\ell - 2}\}$$

The consumer can choose to work or have leisure in maximal $\bar{L} = 5$ hours since the rest must be used for resting.

- Determine the unique Pareto efficient allocation.
- Can this Pareto efficient allocation be implemented by a Walrasian equilibrium?