Written Exam for the B.Sc. in Economics summer 2015

Microeconomics A

Final Exam

6. August 2015

(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 4 pages in total

Problem 1

True or false? In each case explain your answer.

1) If a consumer has rational preferences then he/she must prefer consumption bundles that contain more of every good.
2) Consider a rational consumer with strictly monotone and convex preferences representable by a differentiable utility function. Assume that the consumption bundle (x_1^*, x_2^*) maximizes utility given prices $p = (p_1, p_2) \gg 0$ and an exogenous income $I > 0$ and that $x_1^* = 0$. Then the (numeric value of the) marginal rate of substitution must exceed the price ratio, i.e. $|MRS(x_1^*, x_2^*)| > \frac{p_1}{p_2}$.
3) A firm that operates on a competitive market cannot earn positive (economic) profits in the long run.
4) A firm that uses labour and capital to produce one output, and which seeks to maximize profit, will, if faced with an increased wage rate, hire less labour input and employ more capital.

Problem 2

A consumer has a Marshallian demand function $x(p, I) = \big(x_1(p_1, p_2, I), x_2(p_1, p_2, I)\big)$ and his Hicksian demand is denoted by $h(p, u_0) = \big(h_1(p_1, p_2, u_0), h_2(p_1, p_2, u_0)\big)$.

1) Show that

$$\frac{\partial x_1(p_1, p_2, I)}{\partial p_1} = \frac{\partial h_1(p_1, p_2, u_0)}{\partial p_1} - \frac{\partial x_1(p_1, p_2, I)}{\partial I} x_1(p_1, p_2, I)$$

   where u_0 is the utility obtained when maximizing utility at prices (p_1, p_2) and income I.

2) Illustrate the two effects in a diagram with x_1 on the horizontal axis and x_2 on the vertical axis, when the price of good 1 increases.
3) Explain what this relation implies for the relationship between the Marshall demand curve and the Hicksian demand curve if good 1 is a normal good.

Problem 3

Consider a competitive market with free entry where each firm has access to the same production technology and hence has the same cost function. The cost function implies that there is a value y_{MES}, that minimizes the average costs. The production technology uses labour and capital, and each year there is a reoccurring cost. Explain what happens with the following three:

- The equilibrium price,
- The quantity sold in equilibrium, and
- the number of firms active in the market.

And please do this for both the short run and the long run.

As you consider the following two changes in the economic environment

1) The reoccurring costs increases
2) The wage rate increases

Problem 4

Consider an Edgeworth economy, consisting of two consumers, Ib and Bo, where Ib has an utility function $u_I(x_1, x_2) = x_1 x_2$ and he owns the initial endowment $e_I = (1,5)$, while Bo has an utility function $u_B(x_1, x_2) = 3\ln(x_1) + x_2$ and his initial endowment is $e_B = (5,1)$.

1) If Ib and Bo exchange one unit of good 1 to one unit of good 2, such that Ib increases his consumption of good 2, will that constitute a Pareto improvement?
2) Find the Pareto optimal allocation in which Bo obtains 3 units of good 2.
3) Derive the Walrasian equilibrium for this economy

Problem 5

Consider a producer of concrete (cement) that both uses labour and capital in the production according to the production technology $f(l,k) = (l-1)^{\frac{1}{4}}k^{\frac{1}{4}}$ for every $l > 1$ and $f(l,k) = 0$ else.

The producer can acquire labour at the wage rate $w > 0$ and capital at the rental rate, $r > 0$. It can sell concrete at the price of $p > 0$ per unit output.

In the short run, the input of capital is fixed at $k_0 = 4$.

1) Derive the short run cost function, $c(w,r;y,k_0)$ given output y and capital k_0.
2) Derive the supply function in the short run, $y(w,r,p;k_0)$, and find the optimal supply if prices are $(p,w,r) = (2,1,4)$
3) Derive the long run supply function, $y(w,r,p)$ and find the optimal supply if prices are $(p,w,r) = (2,1,4)$
4) What happens in the short and long run if the output price changes to $p = 16$?