

Guide¹ to answers, Written Exam for the B.Sc. or M.Sc. in Economics

Microeconomics A, 2nd Year

January 2015

Problem 1

Please provide three different diagrams (a, b, and c) depicting indifference curves, each characterizing a consumer who has preferences which are

- a) Monotonically increasing, and convex
- b) Convex, but not monotonically increasing
- c) Monotonically increasing, but not convex

Answer: a) might stem from utility function $x_1 \cdot x_2$, b) from $(x_1 - 10)(x_2 - 10)$, c) from $x_1^2 + x_2^2$.

Problem 2

Danny is a student consuming food (good 1) and entertainment (good 2), both in continuous, non-negative quantities. Danny's preferences can be represented by the utility function $u(x_1, x_2) = x_1 \cdot x_2$.

Danny has an exogenous income in the form of a 400 \$ stipend. Initially, the price of food is 2, and the price of entertainment is also 2.

- a) Identify the utility-maximizing consumption plan for Danny

The government, in an attempt to make students follow a healthier life-style, taxes the entertainment good heavily, hence increasing its price to 8.

- b) Identify the utility-maximizing consumption plan for Danny after the tax has been introduced
- c) How much of the change in his consumption can be ascribed to the substitution effect, and how much to the income effect (using the concept of Hicks compensation, not Slutsky)?

Answer: The Marshall demand function is $(\frac{1}{2}I/p_1, \frac{1}{2}I/p_2)$; the Hicksian demand function $(u^{\frac{1}{2}} \cdot p_2^{\frac{1}{2}} \cdot p_1^{-\frac{1}{2}}, u^{\frac{1}{2}} \cdot p_1^{\frac{1}{2}} \cdot p_2^{-\frac{1}{2}})$. The initial consumption plan is (100, 100), the new consumption plan is (100, 25). The Hicksian demand after the tax is (200, 50), so the overall change of (0, -75) can be divided into the substitution effect of (+100, -50), and the income effect of (-100, -25).

Problem 3

Define the concept of “endowment effect” of a price change on the behavior of consumers, and provide some examples of how it may yield results that at first seem counter-intuitive.

¹ What is presented here is not a full, satisfactory answer to the problems, but indicates the correct results and important points to be made.

Answer: The endowment effect, in an economy with private ownership, stems from the fact that when a price changes, nominal income (or, rather, wealth) which is not exogenous, will be affected when the consumer owns a quantity of the good the price of which has changed. The endowment effect is the residual of the substitution effects and captures the income effect known from the exogenous income case as well as the impact from the change in nominal income due to the price change and private ownership. For a good for which the consumer is a net seller, and the good is normal, a price increase will increase a consumer's demand, not decrease it as most would expect. This may happen in the labor market: The good is leisure, the price increase is an increase in the wage, and the increased demand for leisure is equivalent to labor supply being diminished. Or in the capital market where the good is "consumption today", the price increase is caused by a higher interest rate, and the increased demand is equivalent to less saving.

Problem 4

Consider the firm ToyFun producing toys for children, selling to a market characterized by perfect competition. It does so using two inputs both of which can be used in continuous, non-negative quantities:

- Labor, the quantity of which can be changed in the short run
- Capital, the quantity of which can only be changed in the long run.

ToyFun's production function is given by $y = L^{1/2} \cdot K^{1/2}$. At the moment, the firm has a fixed quantity of capital which is 64, and it faces a wage rate of 4, whereas the rental price for capital is 9. The price of toys is p .

- a) Please identify the firm's short run supply curve, expressing this mathematically as well as in a clear diagram
- b) What happens to the short run supply curve if the wage rate increases to 9?
- c) Please identify the firm's long run supply curve, at wage rate 4, expressing this mathematically as well as in a clear diagram

Answer: a) Concerning short term supply, first consider the FOC $w/p = MPL$, i.e. $w/p = 1/2 L^{-1/2} K^{1/2} = 4 L^{-1/2}$ giving us that $L = 16w^{-2}p^2$, so $y = 32w^{-1}p$. Hence, at the wage 4 we have $y = 8p$, while b) at wage 9, we have $y = (32/9)p$. c) Long run supply: Cost minimization in the long run means having a labor-capital-ratio of 9/4. With capital of 64, this entails 144 units of labor, total costs being 1152, output being 96, so average total costs when producing 96 units of toy become 12. As the production function clearly has constant return to scales, the long run supply curve is horizontal at price 12.

Problem 5

Consider the two Welfare Theorems, the first saying that under certain assumptions, concerning the preferences of consumers and production sets of firms, an allocation belonging to a Walrasian equilibrium will be efficient; the second saying that under certain (other) assumptions, an efficient allocation may be implemented as an allocation belonging to a Market equilibrium with transfers.

- a) Please state which assumptions are needed for the First Welfare Theorem

- b) Please state which assumptions are needed for the Second Welfare Theorem
- c) Provide some intuition for your answers in a) and b)

Answer: Monotonically increasing preferences are needed in the first, to ensure that no consumer is at a local satiation point, making it possible to transfer consumption goods from this consumer, without hurting him or her, hence benefitting other consumers. Convexity is, however, not necessary (although it may be useful for ensuring existence for a Walrasian equilibrium). For the second Welfare theorem, however, convexity is needed, both for consumers and producers, to ensure that the individual consumption and production plans of the allocation are both local and global maximizers of utility and profit, at the price system needed to implement the allocation in a market equilibrium. Monotonically increasing preferences are needed, too, to ensure that an expenditure minimizing consumption plan is also a utility maximizing one.

Problem 6

Consider an Edgeworth economy with two consumers, Alice and Betty, having the utility functions, $u_A(x_{1A}, x_{2A}) = x_{1A} \cdot x_{2A}$ and $u_B(x_{1B}, x_{2B}) = 5 \cdot \ln(x_{1B}) + x_{2B}$. Good 1 is food, and good 2 is drinks, and both can be consumed in continuous, non-negative quantities (Betty, however, must have a positive quantity of food). The total initial endowment is (60, 60). It is a private ownership economy in which Alice initially owns (20, 40) and Betty initially owns (40, 20).

- a) Identify the Walrasian equilibrium, including the equilibrium value of the price of good 1 (using good 2 as numeraire), and the trades taking place between the two agents
- b) What would happen with the equilibrium price if Alice owned a little more of good 1, and Betty owned a little less?

Answer: Let us solve both problems at once. Clearing the food market, i.e. solving $\frac{1}{2} \cdot [p_1 \cdot e_{1A} + e_{2A}] / p_1 + 5 / p_1 = 60$, gives us the equilibrium price $p_1^ = [e_{2A} + 10] / [120 - e_{1A}]$, so the answer to a) is that the equilibrium price of food is $\frac{1}{2}$ when A owns (20, 40). A will consume (50, 25), and B will consume (10, 35), hence A buys 30 units of food, and sells off 15 units of drinks, and vice versa for B. Considering the equilibrium expression for the food price, we see (question b) that it will increase if A owns more food, whereas B owns less; the intuition being that whereas B's demand for food does not depend on her income, food is a normal good for A, so making A richer and B poorer will increase aggregate demand for food, hence increasing the market-clearing price.*