UNIVERSITY OF CAMBRIDGE

ECT1

ECONOMICS TRIPOS PART I

Monday 12 June 2017   9:00-12:00

Paper 1

MICROECONOMICS

Answer **ALL SIX** questions from Section A and **TWO** questions from Section B.

Section A and B will each carry 50% of the total marks for this paper.

Each question within each section will carry equal weight.

Write your **candidate number** (not your name) on the cover of each booklet.

Candidates are asked to note that there may be a reduction in marks for scripts with illegible handwriting.

If you identify an error in this paper, please alert the **Invigilator**, who will notify the **Examiner**. A **general** announcement will be made if the error is validated.

STATIONERY REQUIREMENTS
20 Page booklet x 1
Rough work pads
Tags

SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAMINATION
Calculator - students are permitted to bring an approved calculator

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator.

SECTION A

1. A decision maker (DM) is facing a set of alternatives.

    (a) What does it mean for DM to have rational preferences over these alternatives?

    (b) What does it mean for DM to be a utility maximiser?

    (c) Explain why a utility maximiser necessarily has rational preferences.

    (d) If this set of alternatives is finite, then explain briefly why DM with rational preferences is necessarily a utility maximiser.

    (e) Give a concrete example of a DM with rational preferences who is not a utility maximiser.

2. A consumer's preferences over bundles of two divisible goods are represented by the following utility function:

    $$u(x, y) = x + y^2.$$

    Unit prices of these goods are denoted by p_x and p_y, respectively, and are positive.

    (a) Draw at least three indifference curves for this consumer, depicting x on the horizontal axis, and y on the vertical axis.

    (b) Suppose that buying the bundle $(2, 5)$ exhausts the consumer's budget. Moreover, $MU_x/p_x = MU_y/p_y$ at this bundle. What can you say about this consumer's optimal choice? How does this bundle relate to her optimal choice?

    (c) For what price ratios p_x/p_y would this consumer spend all of her budget on a single good? Explain briefly.

3. A consumer lives for two periods. Denoting his consumption in these periods by c_1 and c_2, respectively, his preferences over consumption possibilities are given by

    $$u(c_1, c_2) = c_1^2 c_2^3.$$

    The unit price of the consumption good is 1 in both periods. His income is 100 in period 1, and 150 in period 2.

    (a) If the consumer could borrow or save without interest, what would be his optimal choice? That is, how much would he borrow (from his future income) or save (from his present income)? What would be his resulting consumption?

(b) Suppose, instead, that the consumer can borrow or save at an interest rate of 50%. What would be his optimal behaviour now?

4. An exchange economy has two agents, A and B, and two goods, x and y. A's endowment is 1 unit of good x and 1 unit of y. B has 2 units of x and no units of y. A has utility function $u^A(x_A, y_A) = \min\{x_A, y_A\}$; B has utility function $u^B(x_B, y_B) = x_B + 2y_B$.

(a) Draw the Edgeworth Box.

(b) Find the equation of the contract curve.

(c) Find a pair (p_x, p_y) of competitive equilibrium prices. Is the equilibrium price ratio necessarily unique?

5. For an economy with one public good and one private good and two agents, suppose that units of the private good can be turned into units of the public good at the rate of one-to-one. Suppose also that the amount of the public good and the distribution of the private good between the two individuals is such that one person's marginal rate of substitution (MRS) of private good for public good is 0.4, while the other's MRS is 0.7. Is this allocation efficient? If not, explain how a Pareto-improvement can be brought about. State a necessary condition on the agents' MRS for an allocation to be Pareto-efficient.

6. 'As long as preferences satisfy the non-satiation property, any desirable allocation of goods can be achieved in competitive equilibrium by a suitable redistribution via income taxes'. Comment.

SECTION B

7. (a) Define Marshallian and Hicksian demands. Briefly explain the difference.

    (b) Consider a non-Giffen inferior good. What happens to the consumer's Marshallian demand for this good if its price rises from p' to p''?

    (c) What are the directions of the substitution and income effects related to this price change? Which effect dominates?

    (d) The graph below depicts the changes in the consumer's Marshallian and Hicksian demands (to be denoted $x(\cdot, \cdot)$ and $h(\cdot, \cdot)$, respectively) in relation to the price change between p' and p''. The two points marked on the curves are the consumer's Marshallian demands at prices p' and p'', where the horizontal axis depicts price, and the vertical axis depicts demand. Copy this figure on your answer sheet, and identify the six relevant points marked on the graph below (two on the curves and four on the axes). Explain which curve corresponds to what.
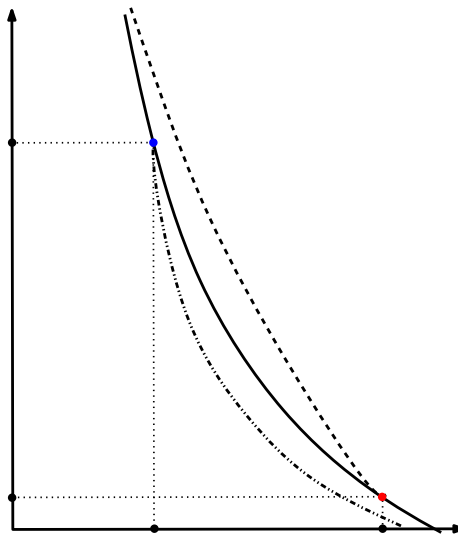
    (e) Explain why the curves are ordered the way they are (the dashed curve on top, the solid curve in the middle, etc.)

8. Suppose there is only one technology to produce a particular good, therefore all firms producing this good are effectively identical. Assume also that this technology has diminishing returns to scale.

    (a) Suppose S_n stands for the industry supply curve of this good when n firms are active. How does S_n compare with S_{n+1}? Give a plausible illustration of the supply curves S_1, S_2, S_3 on the same graph in which quantity is depicted on the horizontal axis. (Use a whole page to make sure your drawing is big enough to accommodate the answers to parts (b), (c), (d) below.)

(b) Suppose c^* is the minimum possible value of average cost for these firms. Now indicate clearly on the same graph which (quantity, price) points we may observe in reality.

(c) Illustrate a demand curve on this graph which leads to exactly two firms operating. Explain why this is the case.

(d) If the demand is strong enough (or if the firms are small enough), we should be observing an approximately flat industry supply curve. Explain why. What can you say about the market price of this good under these circumstances?

9. Consider a labour market with an upward sloping labour supply curve.

(a) What does it mean for the wage to be competitive?

(b) If the market is monopsonistic, i.e., if there is a single firm employing labour, how would this firm set the wage? How would this wage compare with the competitive wage? Explain briefly.

(c) Using a graph to illustrate labour (supply and demand) on the horizontal axis; and wage (and unit cost of labour) on the vertical axis, compare the monopsonistic market with that of the competitive market in terms of the level of employment, the wages, the firms' surplus, and the workers' surplus.

(d) Discuss whether unemployment would go higher or lower if the government imposes a minimum wage above the market wage in this monopsonistic market.

10. 'An externality problem is really a problem of a missing market. Invariably the solution is to create the market'. Discuss.

11. (a) A production economy with one input (labour) and one produced good has many consumers and many firms. All the firms have the same production function, which exhibits constant returns. Explain why any competitive equilibrium price pair of this economy is also a competitive equilibrium price pair of an economy with a single agent and a single firm.

(b) Robinson Crusoe has utility function $u(f, \ell) = \ln(f) + \ln(\ell)$, where f is his consumption of food, ℓ is his number of hours of leisure and $\ln(\cdot)$ is the natural logarithm. He has $T > 0$ hours which he splits between leisure and labour. There is one firm, owned by Robinson, which produces $y(L)$ units of food with L hours of labour input, where

$$y(L) = L^\alpha.$$

Suppose that $0 < \alpha < 1$.

(TURN OVER)

i. Find Robinson's optimal production plan and sketch a diagram to illustrate it.

ii. Suppose that the firm acts as a price-taker. Normalizing the food price to 1, find the firm's food supply function, labour demand function and profit function for the case $\alpha = 0.25$.

iii. Explain what is meant by a *competitive equilibrium* for this model.

iv. Use your result in (i) to deduce the equilibrium price pair, explaining which theorem you use to do this.

v. Now suppose that $\alpha > 1$. Does a competitive equilibrium exist? Explain your answer diagrammatically.

12. Consider a Ricardian trade model with two countries (A and B) of equal populations and two produced goods (x and y). Consumers in country A are all identical and have utility function $u_A(x_A, y_A) = x_A^{3/4} y_A^{1/4}$, where x_A and y_A are consumption of good x and good y, respectively. Consumers in country B are all identical and have utility functions $u_B(x_B, y_B) = x_B^{1/4} y_B^{3/4}$. All consumers have 1 unit of labour and supply it inelastically. They have equal shares in all firms in their own country but have no other endowments. In country A all firms in the x industry have production function $f_A^x(L) = 6L$, where L is labour input. All firms in the y industry have production function $f_A^y(L) = 12L$. The corresponding production functions in country B are $f_B^x(L) = 10L$ and $f_B^y(L) = 4L$.

(a) Sketch the (per-person) production possibility set for each country when trade is not possible (autarky).

(b) Sketch the corresponding joint production possibility set when trade in goods is possible.

(c) Find competitive equilibrium prices for each country for the autarky case.

(d) Now suppose that trade in goods is possible. Assume that in competitive equilibrium each country specialises completely in one good.

   i. For each country, write down an equation relating the wage to the price of the good which is produced in that country.

   ii. For each country, write the budget constraint of a typical consumer at equilibrium prices.

   iii. Hence find the competitive equilibrium prices and quantities, normalizing the price of good x as 1. What is the quantity of exports and imports of each good? Explain why this is an equilibrium.

(e) Briefly comment on the change in relative goods prices when trade is opened and on the effect on the welfare of the agents in the two countries.

END OF PAPER