

ECONOMICS TRIPOS PART I

Monday 9 June 2008

9-12

Paper 1

MICROECONOMICS

Answer **six** questions only from Section A, and **two** questions only from Section B.

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

STATIONERY REQUIREMENTS SPECIAL REQUIREMENTS

20 Page booklet x 1

Approved calculators allowed

Rough work pad x 1

Tags

<p>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</p>

SECTION A

- 1 Luxury goods have inelastic demand. Comment.
- 2 Suppose that it takes four units of input x_1 and three units of input x_2 to produce one unit of y . Write down the production function for this technology. The cost of the inputs are w_1 and w_2 respectively. Solve the cost minimisation problem.
- 3 Suppose that two firms, each with constant marginal cost equal to c , compete as in the Bertrand game, except that prices have to be in whole numbers of pence. Find two Nash equilibria in pure strategies. In each case, are the equilibrium strategies weakly dominated? Are they strict equilibria?
- 4 The Engel curve is always upward sloping. Comment.
- 5 Each of two people decides whether to contribute to a public good. Both are better off if they both contribute than if neither contributes. Formulate the situation as a strategic game and find its (pure) Nash equilibria under the following assumptions:
Each person, whatever the other's decision is, prefers not to contribute himself.
- 6 Suppose that someone start to play golf. Will this make it more likely that he or she will work less in response to an increase in the wage rate? Explain.
- 7 'If a game has more than one Nash equilibrium, each Nash equilibrium must be a subgame-perfect equilibrium'. Comment.
- 8 An inventor has launched a new product for which the estimated demand is linear. It cost the inventor a capital sum K to invent the product. The technology for producing the good exhibits constant returns to scale. Show a condition under which the inventor would break even.
- 9 Two individuals have to decide which of three possibilities X , Y and Z , to choose. Individual 1 first eliminates one of the choices and individual 2 then chooses between the remaining two. 1 prefers X to Y and Y to Z , while 2 prefers Z to Y and Y to X . Represent the situation as a game in extensive form and find a subgame-perfect equilibrium, describing the equilibrium. Is it the only subgame-perfect equilibrium?
- 10 'According to Walras' Law, the value of aggregate excess demands is equal to zero as long as prices are equilibrium prices'. Comment.

SECTION B

- 11 Suppose that household services become tax deductible in a country where income is taxed at the household level. What would be the likely effect on the households labour supply? Illustrate graphically and explain the factors that would influence the size of the effect.
- 12 Two firms compete by simultaneously choosing quantities in each of a number of successive periods. In each period they both have the same cost function, $C(q) = cq$, and the inverse demand function is linear: $p(Q) = a - bQ$, where Q is the sum of the two firms' quantities. Assume that $a > c > 0$ and $b > 0$.
- (a) What is the collusive outcome.
- (b) Can it be sustained as a subgame perfect equilibrium with a (i) finite and (ii) infinite number of repetitions?
- (c) In each case comment on the role of the discount factor.
- 13 In an exchange economy there are two goods (corn and wool) and two agents, A and B . Agent A is endowed with one unit of corn, but no wool, and agent B has one unit of wool but no corn. A 's utility function is

$$u_A(x_A^c, x_A^w) = \min[x_A^c, x_A^w].$$

and B 's utility function is

$$u_B(x_B^c, x_B^w) = (x_B^c)^{0.5}(x_B^w)^{0.5}.$$

- (a) Draw the Edgeworth Box and the contract curve.
- (b) Find an expression for B 's marginal rate of substitution. Using this, and the Edgeworth Box, deduce the equilibrium prices and allocation.
- (c) Find the excess demand functions and hence confirm the equilibrium prices and allocation that you found in (b).
- (d) Find the new equilibrium prices and allocation if A gets an extra 0.5 units of corn in his endowment, everything else remaining the same. Is A better off as a result of this change?

TURN OVER

- 14 Consider an industry that is in long run competitive industry equilibrium. What would happen in the short run if the government were to impose a quantity tax? What would happen in the long run? Comment on the effect on the total number of firms, the output per firm and the market clearing price.
- 15 An individual's preferences over different bundles of good x and z can be represented by the utility function \sqrt{xz} . The price for one unit of each good is $p_x = 10$ and $p_z = 8$. The individual consumes 10 units of x .
- (a) What is the individual's income? How many units of z does he consume? What is the individual's utility from this bundle?
- (b) Now suppose that the price of z increased to 10. Derive the optimal bundle for the new relative price that would keep the individual's utility constant. How does it compare with the old bundle? What is this effect called? What bundle will the individual choose for the new relative price?
- (c) How does it compare with the old bundle? What can you infer about the sign and the size of the income effect?
- 16 Two fishery companies (called 1 and 2) fish in a common lake. Each simultaneously chooses how many boats to employ and aims to maximize its own profits. Letting a_1 and a_2 be the number of boats chosen by 1 and 2 respectively, 1's profit is

$$a_1 - ka_1a_2 - 0.5a_1^2$$

and 2's profit is

$$a_2 - ka_1a_2 - 0.5a_2^2,$$

where $k > 1$ is a constant. You may assume that a_1 and a_2 are continuous variables.

- (a) Explain why the profit functions might take this form.
- (b) Find the best-response functions and graph them. Show that there is only one Nash equilibrium and that in equilibrium each company chooses $(1 + k)^{-1}$ boats.
- (c) Now suppose that the local council dictates the number of boats each company may employ, treats them equally and acts so as to maximize the sum of their profits. Show that the council will choose $(1 + 2k)^{-1}$ boats for each of them.
- (d) Explain, using this example, how externalities may cause inefficiency and how the problem might also be solved by (i) taxation and (ii) assignment of property rights.