ECONOMICS TRIPOS PART I

Monday 7 June 2010 9:00-12:00

Paper 1

MICROECONOMICS

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

Answer all parts to the question.

Sections 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 **number** not your name on the cover of each booklet.*

STATIONERY REQUIREMENTS
20 Page booklet x 1
Rough work pads
Tags

SPECIAL REQUIREMENTS
Approved calculators allowed

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) Find all the Nash equilibria of the following game:

	L	M	R
U	$1, 4$	$4, -1$	$5, 1$
D	$3, 0$	$3, 3$	$0, -1$

   (b) Suppose that the payoffs were changed in such a way that the row player received an extra 5 whenever the column player played L and the column player received an extra 5 whenever the row player played U. Find all the Nash equilibria of the new game.

2. Agent A has an endowment of 3 units of good x and none of good y, while agent B has 1 unit of x and 4 of y. Their respective utility functions are

$$u_A(x_A, y_A) = 2\,x_A + y_A$$

   and

$$u_B(x_B, y_B) = (x_B)^{\frac{1}{3}}\,(y_B)^{\frac{2}{3}},$$

   where x_i and y_i $(i = A, B)$ are i's consumption of x and y respectively.

   (a) Sketch the Edgeworth box and find the equation of the contract curve in terms of x_A and y_A.

   (b) Deduce the competitive equilibrium prices and quantities.

3. Two people (player 1 and player 2) simultaneously contribute money for a public good. If player 1 contributes c_1 and player 2 contributes c_2 then the payoff of player i $(i = 1, 2)$ is given by

$$u_i(c_1, c_2) = \alpha_i\,\ln(c_1 + c_2) - c_i,$$

   where $\alpha_i > 0$ is a constant and c_i may be any non-negative amount. Sketch the best-response functions and find all the Nash equilibria:

   (a) if $\alpha_2 > \alpha_1$;

   (b) if $\alpha_2 = \alpha_1$.

4. Consider a utility function $u(c_1, c_2) = c_1^a\,c_2^b$ and a production function $f(x_1, x_2) = x_1^a\,x_2^b$. Suppose that we multiply both functions by a constant $k > 0$. How do the solutions to the corresponding utility-maximisation problem and cost-minimisation problem change?

5. To produce one unit of a good a manufacturer needs m units of materials that cost r per unit. An unskilled worker can be hired at an hourly rate of w_1 and would need 10 hours to produce one unit of output. A skilled worker can be hired for an hourly rate of w_2 and is five times as productive as an unskilled worker. Let L_i, $i = 1, 2$ denote the number of hours worked by a low and high skilled worker respectively, and let K denote the amount of material used. Write down the production function that represents this technology and derive the corresponding cost function.

6. Draw the indifference curves of the following utility function: $u = x\,y$ for $x < k$ and $u = k\,y$ for $x \geq k > 0$. Derive the marginal rate of substitution and provide an interpretation of the shape of the indifference curves.

Section B

7. Two players (A and B) bid simultaneously for a prize worth 3. Each bids either 0 or 2. If one player bids high and the other player bids low then: the high bidder wins the prize and pays her bid; and the low bidder loses the prize and pays nothing. If they both make the same bid, then each has probability $\frac{1}{2}$ of winning the prize and paying her bid and probability $\frac{1}{2}$ of losing the prize and paying nothing.

   (a) Represent this as a normal-form game and find all the Nash equilibria.

   Now suppose that A can choose either to play the above game or simply to buy the prize for a price of 2.

   (b) Draw the extensive form of this new game.

   (c) Find all the Nash equilibria in pure strategies.

   (d) Is backward-induction equilibrium well-defined in this game?

   (e) Define pure-strategy subgame-perfect equilibrium and find all the pure-strategy subgame-perfect equilibria.

   (f) Which of the subgame-perfect equilibria is the most plausible? Why?

[TURN OVER]

8. Two firms each have constant marginal cost c and face a linear market demand function $Q = a - p$. They choose prices simultaneously. All customers buy from the one with the lower price, or from firm 1 if the two prices are equal.

   (a) Show that there is a unique pure-strategy equilibrium.

   (b) Now suppose that firm 1 first chooses a price and that firm 2 then sets its price after observing firm 1's price. Find the pure-strategy subgame-perfect equilibria of this game.

   Now suppose once again that the firms play the simultaneous-move game, but that market share is equal if the prices are equal. Moreover, this game is repeated infinitely many times and both players discount the future using the same discount factor δ. At the start of each play, both firms know all the prices chosen in the past.

   (c) What is meant by a subgame in this game?

   (d) From the point of view of the firms, what is the best subgame-perfect equilibrium? Explain why it is an equilibrium.

   (e) Suppose that there is an unexpected temporary or permanent increase in demand. Explain how the above model can be used to predict what might happen.

9. Suppose that the demand for the good produced by a firm is given by $q = a - b\,p$, where q is the quantity, p is the price and $a, b > 0$. Suppose further that the cost function of the firm is $c = f + m\,q$, where $f, m > 0$.

   (a) If this is the only firm, then what quantity will it produce?

   (b) What quantity would be produced by a regulated monopoly?

   (c) What is the strongest argument for regulating this monopoly?

10. Consider a consumer who lives for two periods. The consumer has a utility function $\sqrt{c_1\, c_2}$ over current and future consumption. The consumer's income in the first period is $I_1 = 12 - H$, where H is time spent in education. The consumer's income in the second period is $I_2 = A\, H^a$ is the human capital production function and $a < 1$.

    (a) Suppose that the consumer has no access to capital markets. Find the optimal human capital investment H, and the current and future consumption c_1 and c_2.

    (b) Now assume that the consumer can borrow and save at the rate r. Find the optimal human capital investment H and first-period savings S.

    (c) Will an individual who has access to educational loans spend more time in education? Justify you answer.

11. The standard rate of VAT in the UK was temporarily reduced to 15 per cent on 1 December 2008 and it returned to 17.5 per cent on 1 January 2010. There was hardly any increase in consumer spending in December 2008 and the months following. However in December 2009 there was a big increase in consumer spending. Can consumer theory be used to explain why?

12. "Experimental evidence on play of the Ultimatum Game shows that people do not behave according to the predictions of game theory." Discuss.

END OF PAPER