UNIVERSITY OF CAMBRIDGE

ECT1/PBT1
ECONOMICS TRIPOS PART I
PSYCHOLOGICAL AND BEHAVIOURAL SCIENCES TRIPOS PART 1

Monday 9 June 2014   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.

Write legibly.

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 Suppose that John's marginal utility of CDs when he has x CDs is given by $u(x, y) = \frac{x}{3}$, while his marginal utility of DVDs when he has y DVDs is given by $u(x, y) = \frac{y}{2}$.

   (a) What is John's utility function?
   (b) Compute the marginal rate of substitution.
   (c) Which of these two bundles does he prefer: (i) $(3, 2)$, (ii) $(2, 3)$?
   (d) Suppose that John's budget is 20 pounds, the price of a CD is £3 while the price of a DVD is £5. If offered bundles (i) and (ii), which one will he buy? Why?

2 Suppose that a monopolist faces the demand function $p(z) = 20 - 2z$, where z is output. The firm's production function is given by $z = K^{1/2}L^{1/2}$ where K is the amount of capital and L is the amount of labour the firm uses. Suppose that the price of one unit of capital is 2 and the price of one unit of labour is 2.

   (a) Derive the monopolist's cost function.
   (b) How much will the monopolist sell?
   (c) Briefly describe what economists mean by 'third degree price discrimination'.
   (d) Briefly discuss how your answer to part (a) would change if the monopolist could engage in third degree price discrimination. (Note: Do not try to derive this mathematically).

3 Suppose that the utility Emily derives from consuming an amount x of wine and an amount y of cheese is given by

$$u(x, y) = \min\{3x, 2y\}$$

   (a) What kind of preferences does Emily have for wine and cheese?
   (b) Draw her indifference curves for a utility level of 5 and 10.
   (c) Suppose that one unit of wine costs £10 and one unit of cheese costs £3. If Emily has £30 to spend, how much wine and cheese will she consume?

4 Two people each observe a crime and each decides whether to report it. There is a cost $c > 0$ of reporting it. For each person the benefit of the crime being reported by at least one person is $v > 0$. Represent this situation as a strategic game. Find all the Nash equilibria, in pure and mixed strategies.

5   Consider a Hotelling model of electoral competition in which there are two candidates and voters' preferred political platforms are distributed uniformly on the unit interval $[0, 1]$.

(a)   Each candidate simultaneously announces a platform and each voter then votes for the candidate whose announced platform is closest to her preferred one. Each candidate wants to maximize the probability of winning the election (each wins with probability 0.5 in the event of a tie). Explain why the profile $(0.5, 0.5)$ is a Nash equilibrium.

(b)   Suppose now that each candidate has a preferred platform, 0.2 for candidate 1 and 0.45 for candidate 2. Suppose also that they are not interested in winning the election per se, but rather each wants the announced platform of the winner to be as close as possible to her own preferred platform. Is $(0.5, 0.5)$ a Nash equilibrium? Describe the best Nash equilibrium for candidate 2.

6   "According to Walras' Law, the value of excess demands must equal the value of excess supplies on each market. Hence, if there are two markets and one clears, the other will clear too". Comment.

SECTION B

7 Suppose that the production function for pens is given by $z = f(P, L)$, where z is the number of pens produced, P is the amount of plastic used, and L is the amount of labour used. Furthermore, let

$$f(P, L) = \theta P^{2/3} L^{2/3}$$

(a) What are the returns to scale of this function?

(b) Assume that one unit of plastic costs £2 and one unit of labour costs £3. Derive the cost function. How are the returns to scale captured in this function?

(c) Show how the cost changes as θ and output change. Briefly discuss your answer.

(d) In one graph, show the cost, marginal cost and average cost curves.

8 A firm has a production function given by

$$z = f(K, L) = 10K^{1/3}L^{1/4}$$

where z denotes output, K is the amount of capital used, and L is the amount of labour used. Suppose that a unit of capital costs $w_k = 6$ and a unit of labour costs $w_l = 7$.

(a) Derive the firm's cost function.

(b) Suppose that the firm operates in a perfectly competitive market, where the market price is p. Find the amount of output produced by a profit-maximising firm.

(c) Suppose instead that the firm is a monopolist and demand is given by $z = 100 - p$ (and assume that $p \leq 100$). Find the first order condition for the optimal level of output.

(d) Will the monopolist find it optimal to set a price of 75? Briefly discuss your answer.

9   Suppose that Annie can work in two periods. She has 10 hours in each period, which she can allocate betwen leisure and work. Leisure in period t is denoted by l_t, hours worked in period t is denoted by h_t, and consumption in period t is given by c_t. Her utility is given by

$$u(c_1, c_2) = c_1^{1/3} + c_2^{1/3} + l_1^{1/3} + l_2^{1/3}.$$

Her wage in period 1 is given by $w_1 = 3$, and her wage in period 2 is given by $w_2 = 5$. The price of one unit of consumption is 1.

(a) Explain why it might make sense for Annie's period 2 wage to be greater than her period 1 wage.

(b) Suppose that she cannot save or borrow. How much will she work in each period? How much will she consume in each period? Compare your results for periods 1 and 2 making reference to the income and substitution effects.

(c) Now suppose that Annie can save and borrow, and that the interest rate is 10%. How much will she work in each period? How much will she consume in each period? Compare your answer to that in part (b).

10   (a) State the First Fundamental Theorem of Welfare Economics and explain, in the context of an Edgeworth Box economy, why it is true. Which assumptions of the Theorem are most likely to be violated in practice, and why?

(b) 'The Second Fundamental Theorem of Welfare Economics is of doubtful relevance in practice'. Discuss.

11   Two firms simultaneously decide whether to enter a new market. There is a cost $k > 0$ of entering. If only one firm enters, it will then be a monopolist; if both enter, each observes that the other has entered and they then act as duopolists, simultaneously choosing quantity (in each case the market will exist only for one period). Both firms have constant marginal production cost $c > 0$ and the inverse market demand curve is linear: $p = a - bQ$, where $a > c$.

(a) Find all the subgame-perfect equilibria of this game and the equilibrium payoffs.

(b) Find all the subgame-perfect equilibria of a game which is the same as above except that competition at the post-entry stage (when both firms enter) is of the Bertrand rather than Cournot variety.

(c) Suppose now that firm 1 chooses first whether or not to enter and firm 2 decides whether to enter after observing firm 1's choice. Find the subgame-perfect equilibria for the Cournot case. Describe a Nash equilibrium for low k in which firm 1 does not enter and show that it is a Nash equilibrium.

12   Two players play the following simultaneous-move game twice:

	C	D
C	$2,2$	$-1,3$
D	$3,-1$	$0,0$

Before playing the second stage of this repeated game, each player observes the strategies played in the first stage. Each player's payoff is the sum of the payoffs obtained in the two stages. Denote the whole repeated game by G.

(a)   Draw the extensive-form of G. How many subgames are there in G?

(b)   How many pure strategies does each player have in G?

(c)   Give an example of a strategy for player 1 which is strictly dominated. Give an example of a strategy which is weakly dominated but not strictly dominated.

(d)   Give an example of a strategy of player 1 for which player 2's best response involves playing C in the first stage.

(e)   Show that there is only one subgame-perfect equilibrium of G.

(f)   Would you expect that players of this game with a large but finite number of repetitions would play the subgame-perfect equilibrium? Why or why not?

END OF PAPER