EC1090

UNIVERSITY OF WARWICK

Summer Examinations 2015/2016

Microeconomics 1

Time Allowed: 3 Hours.

Candidates should answer **BOTH QUESTIONS IN SECTION A** (40 marks), and **THREE QUESTIONS IN SECTION B** (20 marks each). Answer Section A questions in one booklet and Section B questions in a separate booklet.

Approved hand calculators may be used.

Read carefully the instructions on the answer book provided and make sure that the particulars required are entered on each answer book. If you answer more questions than are required and do not indicate which answers should be ignored, we will mark the requisite number of answers in the order in which they appear in the answer book(s): answers beyond that number will not be considered.

Section A: Answer BOTH questions

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1. George purchases two goods, coffee and apples. He has the utility function

$$U(X,Y) = 4x^2y$$

where x denotes the amount of coffee consumed and y the amount of apples. Denote the price of x as P_x and the price of y as P_y.

(a) Given the information above, set out the Lagrangian for George's utility maximisation problem, and derive his demand for apples. Comment on whether apples are a normal, inferior or Giffen good for George and explain your answer. **(5 marks)**

(b) Now suppose that George has a weekly income of £120, the price of coffee is £4 per 100g, and the price of apples is £4 per kg. Given this information, what is the utility maximising combination of coffee and apples for George? **(3 marks)**

(c) If the price of coffee now falls to £2, find his new utility optimising combination of coffee and apples and identify the amount that his consumption of coffee will change due to the Hicksian substitution effect and income effect. Comment on the size and direction of these effects, and sketch a graph showing your results. Explain the difference between Hicksian and Slutsky compensation. **(12 marks)**

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2. There is a football match taking place between Chelsea and Arsenal and you have £1,000 available for consumption. Assume that you don't have an allegiance to one team, so you only care who wins in terms of how it affects your consumption. You can place a bet of £X ≤ £1,000 on the outcome of the game. If you bet £X and lose, you will only have (£1000 - £X), but if you win, you will have (£1000 + £X). You believe that each team has a 50% of chance of winning (and assume that if the game is a draw at the end of 90 minutes, extra time will be played until someone scores). Suppose the function $U(x) = x^{\alpha}$ allows us to represent your indifference curves over gambles using an expected utility function.

(a) You are deciding whether to place £500 on one of the teams winning. If $\alpha = 0.5$, would you decide to gamble? Illustrate your answer in a diagram and explain whether we can conclude anything about your attitude to risk. **(6 marks)**

(b) Suppose you drank too much and woke up in the middle of the game to find that you did place the £500 bet on Chelsea winning. You notice that the score is 2-2. How much would you be willing to pay to get out of the bet? If Chelsea suddenly scores and now you think the probability of Chelsea winning is $\delta > 0.5$, for what values of δ will you now choose to stay in the bet, even if you are given a chance to get out of the bet for free? You should provide an intuitive explanation to your answer as well. **(8 marks)**

Individuals can take out insurance to reduce their risk and various policies can be offered that are actuarially fair or unfair.

(c) Distinguish between actuarially fair and unfair insurance contracts and explain the implication for risk averse individuals when they are deciding whether to purchase insurance and how much insurance to purchase. Can the distinction have implications for society as well? **(6 marks)**

Section B: Answer THREE questions

3. Consider a Bertrand duopoly in a market where demand is given by $Q = 100 - P$. Each firm has constant marginal cost equal to 20.

(a) If the two firms formed a cartel, what would they do? How much profit would each firm make? **(6 marks)**

(b) Explain why the outcome in part (a) is not a Nash Equilibrium. Find the set of Nash Equilibria and explain why it/they constitute Nash equilibria. **(6 marks)**

(c) Now suppose that instead of a continuous price space, prices can only be integers. Find the set of pure strategy Nash Equilibria and explain why they are Nash equilibria. **(8 marks)**

4. Assume Caroline has an income of £500 and spends her income on pasta and transport. Assume also that pasta costs £1/kg, and transport costs £2/km.

(a) Draw Caroline's budget constraint and indicate on your diagram the value of its slope, as well as Caroline's opportunity set (with transport measured on the horizontal axis). **(4 marks)**

An in kind transfer is defined as a payment to individuals in the form of a service or a commodity, rather than cash.

(b) Assuming pasta cannot be resold on the market, draw Caroline's new budget constraint, after the government has provided Caroline with an in-kind transfer in the form of 30kg of pasta. Explain the shape of the new budget constraint. **(5 marks)**

(c) Assume now that the government decides to give Caroline cash, equal to the market value of pasta, instead of the in kind transfer. How much cash would Caroline receive? Show the effect of this income increase on Caroline's initial budget constraint and explain the intuition behind its shape. **(4 marks)**

(d) Explain which type of transfer (in-kind or cash) would be preferred by: Caroline, Government and Society. **(7 marks)**

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5. Suppose the production function for high quality wine is given as below and that in the short run, capital is fixed at 100 units:

$$Q = \sqrt{KL}$$ where K = units of capital and L = units of Labour.

(a) If capital rents for £10 and wages are £5 per hour, find the equation for the short run total cost curve. **(4 marks)**

(b) Given the short run total cost curve you found in part (a), find an expression for the short run marginal cost curve. How much labour will the firm hire, and how much will the firm produce if wine costs £20 per bottle? **(4 marks)**

(c) Suppose that in times of recession, the price of wine falls to £15 per bottle. How much labour will the firm hire, and how much will the firm produce if wine costs £15 per bottle? **(2 marks)**

(d) Suppose the firm believes that the fall in the price of wine will only last for a week, after which it will therefore want to return to the initial level of production (corresponding to a price of £20). Assume also that for each hour that the firm reduces its workforce below that described in part (b), it incurs a cost of £1. Assuming the firm is profit maximising and decides to proceed to act as it does in recessions (charging a price of £15), should it hire the level of labour found in part (b), or in part (c)? **(10 marks)**

6. Suppose that demand for strawberries is given by:

$$Q = 1000 - 5P$$

Where Q represents quantity of strawberries in hundreds of bushels and P is the price in dollars per hundred bushels. The long run supply curve for strawberries is given by:

$$Q = 4P - 80$$

(a) Show that the equilibrium quantity here is $Q = 400$. At this output, what is the equilibrium price? How much in total is spent on strawberries? Find the consumer and producer surplus, and graph your results. **(7 marks)**

(b) How much consumer and producer surplus would be lost if equilibrium quantity was $Q = 300$ instead of $Q = 400$? Show your results in a graph and provide an intuitive explanation. **(6 marks)**

(c) Show how the allocation of the loss of total consumer and producer surplus between suppliers and demanders described in part (b) depends on the price at which strawberries are sold. How would the loss be shared if $P = 140$? Show your results in a graph. **(7 marks)**

7. Consider the following battle of the Sexes game: Jack and Gill each simultaneously decide whether to go to the Ballet (B) or the Football (F). If they choose different venues, both get a payoff of 0. If both go to the football Jack gets a payoff of 2 and Gill a payoff of 1. If both go to the ballet, Jack gets a payoff of 1 and Gill a payoff of 2.

(a) Put this game into normal form and find its Nash Equilibria. **(5 marks)**

Now suppose Jack moves before Gill.

(b) Draw the extensive form game and find its Subgame Perfect Equilibrium. In your answer, you should explain what is meant by a Subgame Perfect Equilibrium and why the Nash equilibrium you have found is Subgame Perfect. Are there any other Nash equilibria that are not subgame perfect? **(8 marks)**

(c) Find a Nash Equilibrium with different payoffs to the Subgame Perfect Equilibrium you found in part (b). Explain why it is not Subgame Perfect. **(7 marks)**

8. Consider the case of a positive consumption externality, where the marginal external benefit is *k* per unit of output. Suppose market demand and supply are given by:

$$X_d = \frac{A-p}{\alpha} \qquad \text{and} \qquad X_s = \frac{B+p}{\beta}.$$

(a) Derive the competitive equilibrium price and output level. **(4 marks)**

(b) Find the socially optimal level of output and compare this with your answer to part (a). **(6 marks)**

(c) If the government decides to intervene using a subsidy to achieve the social optimum, what value will be the Pigouvian subsidy? Show the impact it has on prices paid by consumers and prices received by producers, and illustrate mathematically that this subsidy will achieve the optimal outcome. Use a graphical approach to illustrate your answer and explain the intuition. **(10 marks)**