

**AUSTRALIAN NATIONAL UNIVERSITY**

*Second Semester Examination - 2004*

**ECONOMICS I (HONOURS) (ECON1100)**

*Study Period : 15 minutes*

*Time Allowed : 3 hours*

*Permitted Material: Calculators – non programmable*

**ANSWER ANY 6 OF THE FOLLOWING 8 QUESTIONS  
EACH QUESTION IS WORTH 10, FOR A TOTAL OF 60**

**QUESTION 1**

- (a) Give the formal definition and explain in detail the following concepts:  
(i) dominant strategies (1 point)  
(ii) dominated strategies (1 point)  
(iii) dominance solvable (1 point)
- (b) Consider the following payoff matrix:

		Player 2		
		a	b	c
Player 1	A	3,1	2,3	10,2
	B	4,5	3,0	9,4
	C	2,2	5,4	12,3
	D	5,6	4,5	8,7

Check whether the game is dominance solvable or not and solve it. (7 points)

**QUESTION 2**

“When a non-zero sum game has a mixed-strategy equilibrium, a player’s equilibrium mixture yields her the same expected payoff against each of the other player’s pure strategies”. True or false? Explain and give an example of a game that illustrates your answer. (10 points)

### **QUESTION 3**

Yuppietown has two food stores, La Boulangerie, which sells bread, and La Fromagerie, which sells cheese. It costs \$1 to make a loaf of bread and \$2 to make a pound of cheese. If La Boulangerie's price is  $P_1$  dollars per loaf of bread, and La Fromagerie's price is  $P_2$  dollars per pound of cheese, their respectively weekly sales,  $Q_1$  thousand loaves of bread and  $Q_2$  thousand pound of cheese, are given by the following equations:

$$Q_1 = 10 - P_1 - 0.5P_2, \quad Q_2 = 12 - 0.5P_1 - P_2$$

- a) Find the two stores' best response curves and show the prices at the Nash equilibrium. (4 points)
- b) If the two stores collude and set prices jointly to maximize the sum of their profits, show that the prices will be lower. (4 points)
- c) Bread and cheese are mutual complements. Explain the implications for the results found above. Provide a graph. (2 points)

### **QUESTION 4**

- (a) Explain the main differences between moral hazard and adverse selection. (4 points)
- (b) An economy has two types of jobs, Good and Bad, and two types of workers, Qualified and Unqualified. The population consists of 40% Qualified and 60% Unqualified. In a Bad job, either type of worker produces 10 units of output. In a Good job, a Qualified worker produces 100 and an Unqualified worker produces 0. Companies have numerous job openings of each type, and must pay for each type of job what they expect the appointee will produce. Companies cannot directly observe a worker's type before hiring, but Qualified workers can signal their qualification by getting educated. The cost of getting educated to level  $n$  for a Qualified worker is  $n^2/2$ , and for an Unqualified worker, is  $n^2$ . These costs are measured in the same units as output, and  $n$  must be an integer.
  - (a) What is the minimum level of  $n$  that will achieve separation? (4 points)
  - (b) Now suppose the signal is made unavailable. Which kind of jobs will be filled by which kinds of workers, and at what wages? Who will gain and who will lose from this change? (2 points)

### **QUESTION 5**

Bill Barriers, president of MightySoft Inc., is marketing a new software product called DoorStops. According to his market researchers, the demand for DoorStops is given by the equation:

$$P = 100 - \frac{1}{1000}Q,$$

where  $P$  is the price per copy of DoorStops and  $Q$  is the number of copies sold. MightySoft has spent \$1000000 on developing the product and \$500000 on advertising. In addition to these fixed costs, it has a variable cost of \$10 per unit sold. Therefore, if it sells  $Q$  copies of DoorStops, MightySoft's total costs will be  $C(Q) = 1500000 + 10Q$ . At all levels of output its marginal cost is \$10.

- What are the profit-maximizing price and quantity for MightySoft? Provide a graphical representation. What is the elasticity of demand at this point? (3 points)
- What is the relationship between price charged by a profit-maximizing monopolist and elasticity of demand? Provide the equation and discuss the intuition. (3 points)
- If instead the market was served by a cartel, composed by two firms MightyHard and SoftBall, what would be the profit-maximizing price and quantity when firms collude effectively? (2 points)
- Will this collusive agreement be likely to subsist if monitoring is difficult? Justify your answer. (2 points)

### **QUESTION 6**

There are 25 potential used-car buyers, each of whom is willing to pay \$1200 for a good used car and \$400 for a lemon. Potential buyers want to buy at most one car. Before they purchase a used car, buyers are not able to tell whether it is a good used car or a lemon. The current owners of lemons have a reservation price of \$700 for their cars, and the current owners of good cars have a reservation price of \$200. In this market, there are 5 good cars and 15 lemons. Draw the supply curve.

- Suppose that all the potential buyers believe that all used cars will be offered for sale. Is this optimistic belief self-confirming? (2 points)
- Suppose that all demanders believe that the only used cars that will reach the market are lemons. Is this pessimistic belief self-confirming? (2 points)
- Imagine now that there are 10 good cars and 10 lemons. Draw the supply curve and repeat parts (a) and (b) before for this new distribution. (2 points each)
- Suppose that a new mechanic arrives in town. This mechanic places a high value on his reputation and is known to be scrupulously honest. For a cost of \$100, the mechanic will check the car thoroughly and will certify good cars as good and lemons as lemons. Identify in which of the previous situations the possibility of quality certification unambiguously increases welfare. Justify your answer. (2 points)

### **QUESTION 7**

- (a) Fill the gaps: In a sealed-bid, first-price auction in an informational environment of private values with  $n$  bidders, if private values are uniformly distributed over the real numbers between 0 and 100, then there is an equilibrium in which each individual bids the fraction \_\_\_ of his or her Buyer Value. The object is sold to the person with the highest Buyer Value at a price equal to the fraction \_\_\_ of the highest Buyer Value. (2 points)
- (b) Provide a sketch of proof for the above proposition. (8 points)

### **QUESTION 8**

You are planning to buy a bicycle and a bicycle of the kind you want costs \$50 in the local shop. A departing senior is about to get rid of her bicycle. You are not personally acquainted with the bike owner and will not see her again after she leaves campus. The senior knows that you would be willing to pay \$50 for her bicycle, and you know that it is worth nothing to her if she doesn't sell it to you, because she plans to abandon it if she doesn't sell it to you. Consider a three-stage sequential bargaining game: the buyer makes an offer to the seller, if the seller rejects the buyer's first offer and makes a counteroffer, the buyer will get a chance to reject the counteroffer and make one more offer before the bargaining is over. Making offers and counteroffers takes time and reduces the value of the bicycle to the buyer. If the buyer's first offer is accepted the bicycle is worth \$50 to him. If his first offer is rejected and the buyer accepts the seller's counteroffer, the bicycle is worth \$40 to him. If, instead, the buyer rejects the seller's counteroffer and makes another offer that is accepted by the seller, then the bicycle is worth \$32 to the buyer.

- (a) Explain the concepts of backward induction and subgame perfect equilibrium in general. (4 points)
- (b) Compute the subgame perfect equilibrium of the previous example, assuming all individuals involved are selfish profit maximizers. (6 points)

