

# 國立中山大學 115 學年度 碩士班考試入學招生考試試題

科目名稱：個體經濟學【經濟所碩士班】

## —作答注意事項—

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請斟酌作答。
- 答案卡請以 2B 鉛筆劃記，不可使用修正液（帶）塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶書籍、紙張（應考證不得做計算紙書寫）、具有通訊、記憶、傳輸或收發等功能之相關電子產品或其他有礙試場安寧、考試公平之各類器材入場。
- 試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。
- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

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題號：403002

※本科目依簡章規定「不可以」使用計算機(問答申論題)

共 2 頁第 1 頁

Question 1: A consumer has an amount of income  $m$ . He/she wants to spend the income on two goods, good 1 and good 2. Let  $x_1$  and  $x_2$  be the amount of good 1 and good 2 that he/she purchases, respectively. His/her utility function is the following.

$$u(x_1, x_2) = x_1 + 2 \ln x_2$$

The prices of good 1 and good 2 are  $p_1$  and  $p_2$ , respectively.

- (i) Suppose  $p_1 = 2$ ,  $p_2 = 4$  and  $m = 10$ . What is his/her optimal consumption of good 1 and good 2? (10 points)
- (ii) Suppose  $p_1 = 6$ ,  $p_2 = 4$  and  $m = 10$ . What is his/her optimal consumption of good 1 and good 2? (10 points)

Question 2: Two players, player 1 and player 2, are playing a simultaneous-move game. Player 1 can use strategies U, M, and D, and player 2 can use strategies L, C and R. Their payoffs are described by the payoff matrix in Figure 1.

		Player 2		
		L	C	R
Player 1	U	2, 6	5, 8	6, 5
	M	7, 3	3, 2	2, 1
	D	1, 1	2, 6	3, 3

Figure 1: The payoff matrix in Question 2

- (i) Write down the strictly dominated strategy for player 1. (5 points)
- (ii) Write down the strictly dominated strategy for player 2. (5 points)
- (iii) Write down all the pure-strategy Nash equilibria. (10 points)
- (iv) Write down one mixed-strategy Nash equilibrium in which each player plays at least two strategies with a positive probability. (10 points)

Question 3: Two farmers, farmer 1 and farmer 2, use the same water source to grow crops. The total amount of water is 96. Each farmer gains a positive payoff for selling the crops. On the other hand, each farmer also enjoys the clean water that is left in the water source. Each farmer needs to decide the amount of water he/she uses for the crops. Let the amount of water that farmer 1 uses for the crops be  $x_1$ , where  $0 \leq x_1 \leq 96$ . Let the amount of water that farmer 2 uses for the crops be  $x_2$ , where  $0 \leq x_2 \leq 96$ . The payoff function of farmer 1 is the following.

$$u_1(x_1, x_2) = \sqrt{x_1} + 2\sqrt{96 - x_1 - x_2}$$

The payoff function of farmer 2 is the following.

$$u_2(x_1, x_2) = \sqrt{x_2} + 2\sqrt{96 - x_1 - x_2}$$

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共 2 頁第 2 頁

- (i) Given that farmer 2 uses  $x_2$  amount of water where  $0 \leq x_2 \leq 96$ , what is the best response for farmer 1? (5 points)
- (ii) What is the pure-strategy Nash equilibrium? (10 points)
- (iii) What is the Pareto efficient outcome? (Specify  $x_1$  and  $x_2$  in your answer.) (10 points)

Question 4: There are three firms that produce identical products. Let these three firms be firm 1, firm 2 and firm 3. Each of the firms needs to decide the quantity to produce. Let the quantity produced by firm  $i$  be  $q_i$  where  $i = 1, 2, 3$ . For firm  $i$  to produce  $q_i$ , the cost is  $c_i(q_i) = 2q_i$ . The (inverse) demand function in the market is  $p = 300 - q_1 - q_2 - q_3$ . Consider the following two settings.

- (i) In this setting, all three firms simultaneously decide the quantities to produce.
  - (i-1) Given that firm 2 produces  $q_2$  and firm 3 produces  $q_3$ , what is the best response for firm 1? (5 points)
  - (i-2) What is the pure-strategy Nash equilibrium? (10 points)
- (ii) In this setting, firm 1 first decides to produce  $q_1$ . After that, both firm 2 and firm 3 observe  $q_1$ . Then, firm 2 and firm 3 simultaneously decide the quantities to produce. What is the pure-strategy subgame-perfect Nash equilibrium? (10 points)