

# 國立中山大學 110 學年度 碩士暨碩士專班招生考試試題

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。
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# 國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：個體經濟學【經濟所碩士班】

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 1 頁第 1 頁

1. (15%) Two persons are involved in a situation where the public good,  $G$ , is privately provided. The utility function of each individual is denoted as  $u_i(G, x_i) = \alpha_i \ln G + x_i$ , for all  $i = 1, 2$  where  $x$  is a private good. Denote  $g_i$  as the amount of the public good contributed by the individual  $i$  such that  $G = g_1 + g_2$ . Each individual's budget constraint is shown as  $x_i + g_i = m_i$ . Assume  $\alpha_1 < \alpha_2$ . How much will the individual 1 contribute, i.e.  $g_1$ , in equilibrium?
2. (10%) Consider the game facing Player A and B below where  $X$  and  $Y$  both are integers. Nash equilibrium is  $(Up, Left)$ . Find out the values of  $X$  and  $Y$ .

A \ B	<i>Left</i>	<i>Right</i>
<i>Up</i>	6, $X$	8, $Y$
<i>Down</i>	$X$ , $Y$	12, 3

Figure 1

3. (10%)
  - (A) What is Pareto efficiency? (5%)
  - (B) Does oligopoly imply inefficiency necessarily? Why? (5%)
4. (10%)
  - (A) What is the tragedy of the commons? (5%)
  - (B) And how to fix it? (5%)
5. (10%)
  - (A) What is transaction cost? Also with examples. (5%)
  - (B) What is the Coase theorem? Also with brief discussion. (5%)
6. (10%) Denote  $y$  as output,  $x_i$  as input, and  $w_i$  as input price for all  $i = 1, 2$ . Drive the cost function for each of the following production function given by
  - (A)  $y = x_1 + x_2$ , (5%)
  - (B)  $y = \min \{x_1, x_2\}$ . (5%)
7. (25%) The market is in monopoly. The firm's fixed cost is zero and marginal cost is  $c$ . The market price demand function is given by:  $p = a - q$ . Assume  $a > c$ . Let  $CS$  be consumers' surplus and  $\pi$  the profit.
  - (A) What is the price which maximizes  $\pi$ ? (5%)
  - (B) Following (A), what is the value of  $CS$ ? (5%)
  - (C) And what is the value of deadweight loss? (5%)
  - (D) Let the regulator's objective function be  $O(p) = \alpha \cdot CS + (1 - \alpha)\pi$ , where  $\alpha < 0.5$ . What is the optimal price setting for the regulator? (5%)
  - (E) Draw a graph to demonstrate your answers through (A) to (D). (5%)
8. (10%) Denote  $W_c$  as the competitive wage. Consider a union with an extension of Cobb-Douglas preferences which takes the form:  $U(W, L) = (W - \gamma)^\theta (L - \delta)^{1-\theta}$  where  $\gamma$  and  $\delta$  are reference values for wage ( $W$ ) and employment ( $\delta$ ) respectively. If  $\theta, \gamma$  and  $\delta$  are varied, the function can be used to illustrate a variety of maximands.
  - (A) What are the values of  $\theta, \gamma$  and  $\delta$  if the union is to maximize wage bill? (5%)
  - (B) What are the values of  $\theta, \gamma$  and  $\delta$  if the union is to maximize the size of surplus over that generated by competitive conditions. (5%)

# 國立中山大學 110 學年度 碩士暨碩士專班招生考試試題

科目名稱：統計學【經濟所碩士班】

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國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：統計學【經濟所碩士班】

題號：403003

※本科目依簡章規定「不可以」使用計算機(問答申論題)

共 1 頁第 1 頁

Answer the following five questions, equally weighted

請務必依題序 在答案卷上作答 (5 大題, 共 100 分)

1. (20%) Suppose  $X$  and  $Y$  are jointly distributed according to the joint pdf

$$f_{X,Y}(x,y) = \frac{2}{5} \cdot (2x + 3y), \quad 0 \leq x \leq 1, \quad 0 \leq y \leq 1.$$

Find (a).  $f_X(x)$  and (b).  $P(\frac{1}{4} \leq Y \leq \frac{3}{4} | X = \frac{1}{2})$ . ■

2. (20%) If the random variable  $X$  has a Poisson distribution such that  $P(X = 1) = P(X = 2)$ . Find  $P(X = 4)$ . ■

3. (20%) Find the method-of-moments estimates for  $\mu$  and  $\sigma^2$  based on a random sample of size  $n$  taken from an  $N(\mu, \sigma^2)$  distribution. ■

4. (20%) A random sample of size 2 is drawn from a uniform pdf defined over the interval  $[0, \theta]$ . We wish to test

$$H_0 : \theta = 2$$

versus

$$H_1 : \theta < 2$$

by rejecting  $H_0$  when  $y_1 + y_2 \leq k$ . Find the value for  $k$  that gives a level of significance of 0.05. ■

5. (20%) Let  $\mathbf{x} = (X_1, X_2, X_3)'$  have a trivariate normal distribution with means 6, 4, and 2 and variance 16, 25, and 64, and with  $cov(X_1, X_2) = 6$  and  $coc(X_1, X_3) = 4$  and  $cov(X_2, X_3) = 5$ . Let  $Y_1 = 2X_1 + 3X_2 + X_3 + 2$  and  $Y_2 = 4X_1 + X_3 + 3$ . What is the joint distribution of  $\mathbf{y} = (Y_1, Y_2)'$ ? ■

*End of Questions.*

# 國立中山大學 110 學年度 碩士暨碩士專班招生考試試題

科目名稱：總體經濟學【經濟所碩士班】

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科目名稱：總體經濟學【經濟所碩士班】

題號：403001

※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

1. Consider a two-period endowment model with income ( $y$  and  $y'$ ) and the consumer pays lump-sum tax ( $t$  and  $t'$ ) in the current and future period, respectively. The consumer chooses consumption ( $C$  and  $C'$ ) in the current and future periods, and saving ( $s$ ) in the current period. The real interest rate is  $r$ . Consider that a representative consumer lives in this two-period economy and has a convex preference over the current and future consumption. [50 pts]
- (a) Write down the consumer's current period budget constraint and its future-period budget constraint. Also, derive the (present-value) lifetime budget constraint of the consumer. [10 pts]
  - (b) Use the graphical approach to show the optimal consumption/saving bundle for the consumer to be a lender. The figure should have  $C'$  on the vertical axis and  $C$  on the horizontal axis. It should also contain the lifetime budget of the consumers, and the indifference curve (IC). Make sure you mark the slope of the budget line, its endpoints, the endowment point, the equilibrium current and future consumption ( $C^*$  and  $C'^*$ ), and the equilibrium saving ( $s^*$ ). [10 pts]
  - (c) Consider an increase in the real interest rate. Draw the new budget constraint in the figure, and show how it affects the consumer's intertemporal decisions on  $C$ ,  $C'$ , and  $s$ ? Explain your answer with income and substitution effects, and show how it matters whether the consumer is initially a borrower or a lender. [10 pts]
  - (d) Suppose that the ratio of good borrowers is  $\lambda$  ( $0 < \lambda < 1$ ) and that of bad borrowers is  $(1-\lambda)$  in the credit market. The good borrowers are all identical, and always repay their loans. Bad borrowers never repay their loans. Banks issue deposits that pay a real interest rate " $r$ " to a lender, and make loans to borrowers. Banks cannot tell the difference between a good borrower and a bad one. Consider that banks are in a perfectly competitive market and make zero profits. Find the interest rate on loans (i.e., the interest rate paid by a borrower) determined by banks. Explain the details how you derive it, and whether it is higher or lower than  $r$ . Besides, show the consumer's lifetime budget constraint in a figure with  $C'$  on the vertical axis and  $C$  on the horizontal axis. [10 pts]
  - (e) Use the figure in (d) to show that Ricardian equivalence theorem may not hold under the asymmetric information. Explain clearly how a tax cut in the current period will affect the lifetime income for a borrower given that the government's spending is unchanged. [10 pts]
2. Consider a two-period real model with investment. The consumer chooses consumption ( $C$  and  $C'$ ) and labor supply ( $N_s$  and  $N_s'$ ) in the current and future periods, and determines saving ( $s$ ) in the current period. The firm chooses labor demand ( $N_d$  and  $N_d'$ ) in the current and future periods, and determines investment ( $I$ ) in the current period. The capital accumulation is formulated by  $K' = (1-\delta)K + I$  where  $K$  and  $K'$  are the capital stock in the two periods, and  $\delta$  is the depreciation rate. The production functions in the two periods are  $Y = F(K, N)$  and  $Y' = F(K', N')$  and they follow the standard properties with decreasing marginal product of labor and decreasing marginal product of capital. Now, suppose there is a natural disaster that destroys part of the nation's capital stock " $K$ " in the current period. Use the two figures of the labor market and product market in the current period to show how the decrease in current capital stock  $K$  impacts the equilibrium real wage  $w$ , labor employment  $N$ , real interest rate  $r$ , and aggregate output  $Y$  in the current period. [20 pts]
- Hint: Plot the supply and demand of the current labor market (with the real wage " $w$ " on the vertical axis and the labor employment " $N$ " on the horizontal axis) and the supply and demand of the current product market (with the real interest rate " $r$ " on the vertical axis and the aggregate output " $Y$ " on the horizontal axis). Then, show how the decrease in  $K$  affects the supply and demand in the two markets and how the equilibrium outcomes in the two markets change.

(Two more questions on the next page)

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共 2 頁第 2 頁

3. Consider the Solow growth model without population growth or technological change. The parameters of the model are given by  $s = 0.2$  (savings rate) and  $\delta = 0.05$  (depreciation rate). Let  $k$  denote capital per worker,  $y$  denote output per worker,  $c$  denote consumption per worker. [20 pts]
- (a) Suppose that the production function of aggregate outputs is  $Y = K^{\frac{1}{3}}N^{\frac{2}{3}}$  where  $K$  denotes capital inputs, and  $N$  denotes labor inputs. Rewrite the production function in per-worker terms, and find the steady-state level of capital per worker. [8 pts]
- (b) The golden rule level of the capital per worker,  $k_{gr}$ , maximizes consumption per worker in steady-state. To obtain  $k_{gr}$ , should citizens save more or less? [12 pts]
4. Explain what the Laffer curve is and why it is an Inverted- $U$  shape. [10 pts]