

國立中山大學 113 學年度 碩士班暨碩士在職專班招生考試試題

科目名稱：統計學【經濟所碩士班】

— 作答注意事項 —

考試時間：100 分鐘

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- 違規者依本校招生考試試場規則及違規處理辦法處理。

國立中山大學 113 學年度碩士班暨碩士在職專班招生考試試題

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)

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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%) A die is loaded in such a way the probability of particular face's showing is directly proportional to the number on that face. What is the probability that an even number (偶數) appears? (Hint: $P(\text{'i' face appears}) = P(i) = ki$, $i = 1, 2, \dots, 6$, where k is a constant.)
2. (20%) Let X be a continuous random variable which is uniformly distributed on the interval $[-2, 3]$.
 - (a). Let $U = e^X$. Find the density function of U .
 - (b). Let $V = X^3$. Find the density function of V .
3. (20%) Let (X, Y) have joint density $f(x, y) = e^{-y}$, $0 < x < y$. Find
 - (a). $E(X|Y = y)$.
 - (b). $Var(X|Y = y)$.
4. (20%) Let X_1, \dots, X_n be independently identically distributed with X_i having density $f(x; \theta) = \theta x^{\theta-1}$, $0 < x < 1$, $\theta > 0$. Find the maximum likelihood estimator (MLE) of θ .
5. (20%) An urn contains 10 chips. An unknown number of the chips are white; the other are red. We wish to test

H_0 : exactly half the chips are white

versus

H_1 : more than half the chips are white.

We will draw, without replacement, three chips and reject H_0 if two or more are white. Find

- (a). α .
- (b). β when the urn is 60% white.

End of Questions.

國立中山大學 113 學年度 碩士班暨碩士在職專班招生考試試題

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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 2 頁第 1 頁

Question 1: Consider a consumer with a utility function $u(x_1, x_2) = 2\sqrt{x_1} + x_2$, where x_1 represents the consumption of good 1, and x_2 represents the consumption of good 2. Suppose the price of good 1 is p_1 , and the price of good 2 is p_2 . In addition, the income for the consumer is m . Suppose this consumer chooses his/her consumptions of good 1 and good 2 such that his/her utility is maximized.

- (a) Suppose $p_1 = 2$, $p_2 = 1$, and $m \geq \frac{1}{2}$. What is the demand for good 1 (as a function of m)? (4 points)
What is the demand for good 2 (as a function of m)? (4 points)
- (b) Suppose $p_1 = 2$, $p_2 = 1$, and $0 \leq m < \frac{1}{2}$. What is the demand for good 1 (as a function of m)? (4 points)
What is the demand for good 2 (as a function of m)? (4 points)
- (c) Suppose $p_1 = 2$ and $p_2 = 1$. Draw the Engel curve for good 1. (3 points) Draw the Engel curve for good 2. (3 points)
- (d) Suppose the income is $m = 10$. In addition, suppose initially $p_1 = 2$ and $p_2 = 1$. Now, the price of good 1 becomes $p'_1 = 1$, and the price of good 2 is still $p_2 = 1$. What is the change of demand for good 1? (1 point) What is the (Slutsky) substitution effect? (3 points) What is the income effect? (3 points)

Question 2: Two players A and B are playing a game. Player A has the strategies T and D, and player B has the strategies L, M, and R. The payoff matrix is in Figure 1.

	L	M	R
T	5, 5	3, 2	0, 1
D	2, 3	6, 6	0, 0

Figure 1: The Payoff Matrix of the Game

- (a) Suppose player B chooses strategy R. What is the best response for player A? (3 points)
- (b) What are the pure-strategy Nash equilibria in this game? (10 points)
- (c) What is the mixed-strategy Nash equilibrium in this game? (10 points)

Question 3: Consider a market where there are two firms selling identical goods. Firm 1 is the leader firm, and the firm 2 is the follower firm. Firm 1 sets the price p , and both firms sell the goods at the same price. Suppose Firm 1 produces q_1 and the cost is $2q_1$, and Firm 2 produces q_2 , and the cost is $\frac{1}{2}q_2^2$. In addition, the demand for the goods produced by these two firms is $D(p) = 10 - p$.

- (a) Given p , what is the output q_2^* that maximizes the profit of Firm 2 (as a function of p)? (8 points)
- (b) Given q_2^* , what is the demand for Firm 1 (as a function of p)? (8 points)
- (c) Write down the profit for Firm 1 (as a function of p). (4 points)
- (d) What is the price p that maximizes the profit of Firm 1? (4 points)

Question 4: Consider a linear city that is represented by a line. The line has the length of 1. Consumers are located on the line uniformly, and the density of the population at each point on the line is 1. We can use x with $0 \leq x \leq 1$ to represent a location on the line.

There are two firms that produce identical goods. Firm 1 is located at $x = 0$, and Firm 2 is located at $x = 1$. The cost to produce one unit of the good is 2. This production cost is the same for both firms. Firm 1 sells the products at price p_1 , and Firm 2 sells the products at the price p_2 .

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A consumer need to visit one of the firms before he/she can purchase the good. Each consumer wants to purchase at most one unit of the goods. For a consumer who is located at x , he/she has a traveling cost x^2 to visit Firm 1 and a traveling cost $(1-x)^2$ to visit Firm 2. His/her utility from purchasing a good from Firm 1 is $v - x^2 - p_1$, and his/her utility from purchasing a good from Firm 2 is $v - (1-x)^2 - p_2$. Suppose p_1 and p_2 are such that every consumer would purchase one unit of the goods from one of the firms.

- What is the location of the consumer who is indifferent between purchasing the good from Firm 1 and purchasing the good from Firm 2? (6 points)
- Write down the demand for Firm 1 (as a function of p_1 and p_2). (4 points) Write down the demand for Firm 2 (as a function of p_1 and p_2). (4 points)
- Write down the profit for Firm 1 (as a function of p_1 and p_2). (2 points) Write down the profit for Firm 2 (as a function of p_1 and p_2). (2 points)
- Given p_2 , what is the profit-maximizing price p_1^* for Firm 1 (as a function of p_2)? (2 points) Given p_1 , what is the profit-maximizing price p_2^* for Firm 2 (as a function of p_1)? (2 points)
- Suppose $p_1^* = p_2^*$. What are p_1^* and p_2^* ? (2 points)

國立中山大學 113 學年度

碩士班暨碩士在職專班招生考試試題

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科目名稱：總體經濟學【經濟所碩士班】

題號：403001

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共 3 頁第 1 頁

I. 選擇題；1-10 題為單選題、11-15 題為複選題(共 60 分；每題 4 分，複選題選項全對才給分，不倒扣)

1. 假設物價指數以 2021 年為基期，若知價格由 2021 年至 2023 年，每年各上漲 10%，請問 2023 年物價指數為多少？
(A) 121 (B) 100 (C) 99 (D) 110
2. 以下哪項經濟活動應計入當年的 GNP？
(A) 家庭主婦操持家務的價值
(B) 警察的薪水
(C) 本國人自國外購得汽車之價值
(D) 外籍勞工在台所賺取的工資
3. 關於古典學派的觀點，下列何者正確？
(A) 需求可以自動創造供給
(B) 價格僵固是普遍存在的現象
(C) 貨幣供給增加只會引發物價同比例上升，對產出無任何效果
(D) 貨幣中立性不成立
4. 下列何者符合流動性陷阱發生時的現象？
(A) 總合需求線為水平線(圖形縱軸為物價；橫軸為產出)
(B) 貨幣供給線為水平線(圖形縱軸為利率；橫軸為實質貨幣餘額)
(C) IS 線為水平線(圖形縱軸為利率；橫軸為產出)
(D) LM 線為水平線(圖形縱軸為利率；橫軸為產出)
5. 經濟學家通常將數量變數區分為存量變數(stock variable)與流量變數(flow variable)。下列何者是流量變數？
(A) 貨幣供給
(B) 財富
(C) 國內生產毛額
(D) 資本
6. 下列何者屬於外匯市場的供給？
(A) 本國對外國從事長期及短期投資的結匯
(B) 進口的結匯
(C) 外國國民到本國旅遊或留學的換匯
(D) 外國投資者投資本國所獲之報酬的結匯
7. 有關失業的定義，下列何者正確？
(A) 循環性失業等於摩擦性失業加上結構性失業
(B) 自然性失業等於摩擦性失業加上非自願性失業
(C) 自然性失業等於摩擦性失業加上結構性失業
(D) 失業率等於失業人口除以全國人口

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8. 考量一所得支出模型： $Y = C + I + G + X - M$ ；其中， Y 為所得、消費函數 $C = 100 + 0.8Y$ 、投資函數 $I = 500 + 0.1Y$ ，政府支出函數 $G = 100$ 、出口函數為 $X = 100$ ，以及進口函數為 $M = 100 + 0.1Y$ 。下列何者正確？
- (A) 均衡產出為 600
 - (B) 財政政策乘數為 5
 - (C) 均衡投資為 560
 - (D) 儲蓄函數為 $S = -100 + 0.8Y$
9. 關於總合供給線的敘述，下列何者正確？(假設圖形縱軸為物價；橫軸為產出)
- (A) 總合供給線可以由 IS-LM 模型所推得
 - (B) 名目工資僵固會導致總合供給線呈現正斜率
 - (C) 石油價格上漲會導致總合供給線右移
 - (D) 若總合供給線為正斜率，擴張性財政政策不會產生任何排擠效果
10. 關於總合需求線的敘述，下列何者正確？(假設圖形縱軸為物價；橫軸為產出)
- (A) 總合需求線可以由 IS-LM 模型所推得
 - (B) 凱因斯學派認為總合需求線為垂直線
 - (C) 政府提高消費稅會導致總合供給線右移
 - (D) 古典學派認為總合需求線為垂直線
11. 國際金融理論中，「不可能的三頭馬車」是指下列哪些目標無法同時兼顧？
- (A) 貨幣自主性
 - (B) 資本完全移動
 - (C) 匯率浮動
 - (D) 匯率固定
12. 關於理性預期的特性，下列何者正確？
- (A) 任何變數真正數值的解值只會包含被預料到部分
 - (B) 即使出現隨機干擾項，經濟單位也能事先正確無誤的掌握經濟變數的數值
 - (C) 經濟單位已經充分地運用他們所擁有的情報來預測
 - (D) 經濟單位對任何變數的主觀猜測值 $_{t-1}x_t^e$ 是該變數真正數值 x_t 的不偏估計式
13. 關於 Phillips Curve 的敘述，下列何者正確？
- (A) 短期的 Phillips Curve 顯示通貨膨脹率與失業率間的呈現負相關
 - (B) 短期的 Phillips Curve 顯示通貨膨脹率與失業率間的呈現正相關
 - (C) 長期的 Phillips Curve 顯示失業率與通貨膨脹率無關
 - (D) 長期下，不論通貨膨脹率大小，失業率皆為循環失業率
14. 關於實質景氣循環模型的敘述，下列何者正確？
- (A) 重視技術(technology)或生產力(productivity)變動產生的景氣波動
 - (B) 勞動供給具有跨時替代效果(intertemporal substitution effect)
 - (C) 假設勞動供給無彈性(inelastic)
 - (D) 重視需求面衝擊(demand-side shock)對經濟體系產生的效果

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15. 央行的那些行為可以使名目利率下降？

- (A) 增加法定存款準備率
- (B) 降低重貼率
- (C) 央行進行公開市場操作，買進公債
- (D) 央行進行公開市場操作，賣出公債

II. 填充題(共 20 分；每格 5 分) Note: Answer all the questions on the separate sheets. Please label question numbers clearly. Credit is only granted based on the correct final solution.

1. Consider an economy where exists the representative firm who has a CES form production function: $Y = [\alpha K^\sigma + (1-\alpha)L^\sigma]^{1/\sigma}$, where K denotes physical capital stocks, L represents labor, $\alpha \in (0,1)$ stands for the capital share and $1/(1-\sigma) > 0$ expresses the elasticity of substitution between the two factors. The goods market and both factor markets are perfectly competitive. Given that W denotes the nominal wage rate and P denotes the price level, the slope of the labor demand curve can be identified as (1). Let L^S denote the number of hours the representative household is willing and able to supply at a certain level of the nominal wage rate W^S , and the labor supply curve is specified as $W^S = Ph(L)$, where $h(L)$ is the marginal disutility of labor supply and $h'(L) > 0$. Thus, in the economy the slope of the aggregate supply curve can be derived as $dP/dY =$ (2).
2. Consider a continuous time Solow growth model. The aggregate production function is specified as $Y = K^{0.5}N^{0.5}$, where K is aggregate capital and N is the number of workers. The economy has a constant worker growth rate $\dot{N}/N = 0.02$, a constant saving rate $s = 0.3$, and a constant capital depreciation rate of $\delta = 0.05$. Let I denote aggregate investment, and the law of motion for capital is $dK/dt = \dot{K} = I - \delta K$. The steady state capital per worker can be computed as $K/N =$ (3). In addition, the golden rule saving rate $s_g =$ (4).

III. 問答題(共 20 分) Note: Answer the question on the separate sheets. Please label question numbers clearly, and write legibly.

1. In a *traditional fiscal stimulus* (a debt-financed fiscal stimulus), the government typically borrows money by issuing bonds to fund increased spending or tax cuts. However, in a *money-financed fiscal stimulus*, the central bank directly creates extra money supply, which is then used to finance the government's budget deficit. Galí (2020, *Journal of Monetary Economics*, p.17) states that "First and foremost, a money-financed fiscal stimulus, in the form of a tax cut or an increase in government purchases, provides a way to boost economic activity effectively, as long as prices are reasonably sticky... In particular, it can be designed such that debt and taxes do not need to rise, either in the short run or the long run. Furthermore, such money-financed fiscal stimuli appear to be *more effective* than their debt-financed counterparts."
 - (1) Draw a diagram using the IS-LM theory to analyze Galí's statement. (10pt.)
 - (2) Use the IS-LM model to calculate the impact of a money-financed fiscal stimulus (government spending) on the interest rate. (10pt.)