國立中山大學 111 學年度
碩士班暨碩士在職專班招生考試試題

科目名稱：總體經濟學【經濟所碩士班】

I. 複選題(共 40 分；每題 5 分，該題選項全對才給分)

1. 請利用 $AD - AS$ 模型分析：下列哪一些情形發生會導致均衡物價上漲？

   (A) 廠商生產技術進步；

   (B) 國際石油價格大幅走揚；

   (C) 央行大幅增加 M2；

   (D) 央行提高基準利率；

   (E) 政府因應 COVID 疫情實施「封城」(lockdown)政策，限制民眾外出工作的時間。

2. 供給面學派認為政府降低所得稅率會造成什麼現象？

   (A) 必然能增加稅收；

   (B) 增加總合供給；

   (C) 增加總合需求；

   (D) 增加勞動供給；

   (E) 增加勞動需求。

3. 本國發生下列哪一些情形會造成本國貨幣升值？

   (A) 國際收支盈餘；

   (B) 國際收支赤字；

   (C) 經常帳盈餘、資本帳平衡；

   (D) 經常帳平衡、資本帳盈餘；

   (E) 經常帳與資本帳皆平衡。

4. 假設開放經濟體系的 IS 線為維持商品市場均衡下，所有產出與利率的組合。若 Marshall-Lerner 條件成立，請問下列何者會導致開放經濟體系的 IS 線右移？

   (A) 本國貨幣貶值；

   (B) 外國利率上漲；

   (C) 外國所得提高；

   (D) 本國物價上漲；

   (E) 本國政府支出增加。

5. 下列有關勞動力與失業的敘述中，何者正確？

   (A) 結構性失業屬於自然性失業的一種；

   (B) 摩擦性失業屬於自然性失業的一種；

   (C) 循環性失業屬於自然性失業的一種；

   (D) 總失業人口等於結構性失業人口與摩擦性失業人口的總和；

   (E) 失業率是失業人口占 15 歲以上民間人口的比率。

6. 考慮一古典學派的短期總合供需模型。模型中有商品與勞動兩市場，兩市場均為完全競爭市場。商品市場的總合生產函數為：$Y = 8N^{0.5}K_0^{0.5}$；其中，$K_0 = 4$ 代表短期固定的資本數量、N 代表總勞動雇用量，以及 Y 為總生產量。令 W 代表名目工資率、P 代表物價水準，以及勞動市場的供給函數為：$N^s = 8(W/P)$；其中，N^s 代表總勞動供給量。商品市場總合需求函數為：$P = 15 - 0.125Y$。請判斷下列何者正確？

   (A) 廠商雇用勞動的最適條件為：$W/P = 8N^{-0.5}$；

   (B) 均衡就業水準 $N^* = 16$；

   (C) 均衡產出水準 $Y^* = 64$；

   (D) 均衡物價水準 $P^* = 7$；

   (E) 均衡名目工資率 $W^* = 14$。

7. Phillips 曲線是經濟學家用來表現失業率與通貨膨脹率關係的曲線。假設橫軸為失業率 u 且縱軸為通貨膨脹率 π。此外，假設短期下，民眾的預期通貨膨脹率 π^e 為固定值；長期下，民眾對通貨膨脹率則是沒有錯誤預期。請判斷下列何者錯誤？

   (A) 短期 Phillips 曲線為負斜率的曲線；

   (B) 短期 Phillips 曲線為正斜率的曲線；

   (C) 長期 Phillips 曲線為水平線；

   (D) 長期 Phillips 曲線為垂直線；

   (E) 無論長、短期，Phillips 曲線都為負斜率的曲線。

8. 令 C_0 與 C_1 分別為目前與未來的消費支出、Y_0 與 Y_1 分別為目前與未來的稟賦所得、$U(C_0)$ 與 $U(C_1)$ 分別為目前與未來的效用(假設 $U' > 0$ 且 $U'' < 0$)，以及個人的跨時效用函數：$V(C_0, C_1) = U(C_0) + U(C_1)/(1 + \rho)$；其中，$\rho$ 為時間偏好率。個人面對以下的跨時預算限制式：$C_0 + C_1/(1 + r) = Y_0 + Y_1/(1 + r)$；其中，$r$ 為實質利率。假設個人根據上述模型設定，達成跨時消費最適化決策。請判斷下列何者正確？

   (A) ρ 越大代表個人越迫不及待於目前進行消費，所以 C_1/C_0 越小；

   (B) ρ 越大代表個人越有耐心於未來進行消費，所以 C_1/C_0 越大；

   (C) r 上升導致個人儲蓄增加；

   (D) r 上升導致個人儲蓄減少；

   (E) 若 $\rho = r$，則個人於目前與未來兩期有相同消費量，即 $C_0 = C_1$。

II. 計算與問答題(共 60 分)

Note: Answer all the questions on the separate sheets provided in Chinese or English. Please label question numbers clearly, and write legibly.

1. Consider the following income-expenditure model:

   $$\begin{aligned}
   \text{Expediture:} \quad & E = C + I + G_0 \\
   \text{Consumption:} \quad & C = C_0 + b(Y - T); \ C_0 > 0 \text{ and } 0 < b < 1 \\
   \text{Investment:} \quad & I = I_0 + \gamma Y; \ I_0 > 0 \text{ and } \gamma > 0 \\
   \text{Tax:} \quad & T = T_0 + tY; \ T_0 > 0 \text{ and } 0 < t < 1
   \end{aligned}$$

   where Y denotes income and G_0 denotes the government spending. In the model, investment is positively related to the current level of output ($\gamma > 0$). One possible reason that investment may depend on output is that, when current production and sales are high, firms may expect continued strong demand for their products in the future, which leads them to want to expand capacity. Derive $\partial E / \partial Y$, and draw a graph to explain that why an unstable equilibrium is present when $\partial E / \partial Y > 1$. In addition, derive the multiplier of government spending. (15 points.)

2. Consider a continuous time Solow growth model. The aggregate production function, $Y = F(K, ZN) = K^\alpha (ZN)^{1-\alpha}$, exhibits a constant return to scale, where K is aggregate capital, N is the number of workers, Z is the labor productivity level, and $\alpha \in (0,1)$ is the income share of capital. The economy has a constant worker growth rate n (i.e., $\dot{N}/N = n$), a constant labor productivity growth rate θ (i.e., $\dot{Z}/Z = \theta$), a constant saving rate s, and a constant capital depreciation rate of δ. The law of motion for capital is $\dot{K} = I - \delta K$, where I is aggregate investment.

   (1) Let $E = ZN$ represent the amount of effective workers. Derive the production per effective worker ($y = Y/E$) and use the notation $k \equiv K/E$ in your derivation. Your answer should express y as an explicit mathematical function of k. (10 points)

   (2) In equilibrium aggregate investment equals aggregate saving (i.e., $I = sY$). Solve for the steady state capital per effective worker (k^*) as a function of exogenous parameters. Explain the economic meaning of the steady state in the context of the Solow model. (15 points)

3. Consider a rational expectation model:

   $$\begin{aligned}
   \text{Aggregate demand:} \quad & P_t = -\alpha(Y_t - Y_{t-1}) + M_t; \ \alpha > 0 \\
   \text{Aggregate supply:} \quad & Y_t = Y_{t-1} + \beta(P_t - {}_{t-1}P_t^e) + \varepsilon_t; \ \beta > 0 \text{ and } \varepsilon_t \sim N(0, \sigma_\varepsilon^2) \\
   \text{Monetary policy rule:} \quad & M_t = \overline{M} + u_t; \ \overline{M} > 0 \text{ and } u_t \sim N(0, \sigma_u^2)
   \end{aligned}$$

   where P_t denotes the price level, Y_t stands for output, M_t represents money supply, ${}_{t-1}P_t^e = E(P_t|I_{t-1})$ expresses the expected price level (I_{t-1} is the information set observed by the individual in period $t-1$), and ε_t and u_t denote supply-side shocks and money supply shocks, respectively.

   (1) Solve P_t and Y_t. Your answer may be expressed as the functions of exogenous parameters and Y_{t-1}. (10 points)

   (2) Use the results from (1) to justify the effectiveness of anticipated monetary policy (i.e., $\overline{M}$). In addition, draw a graph to explain the effect of anticipated monetary policy on output. (10 points)

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科目名稱：個體經濟學【經濟所碩士班】

1　(10pt) A household with a monthly income of 900 dollars spends the income on either food or other goods. The price of food is 1, and the price of other goods is 1. Now, the government provides subsidies on food in the form of coupons. Each household has the option of spending 100 dollars to obtain a 200-dollar coupon for food. (In other words, the coupon can only be used to purchase food.)

　　(1)　(5pt) Draw the budget line for this household.

　　(2)　(5pt) Suppose now the way the subsidies are provided is changed. A household can spend x dollars to obtain coupons worth 2x dollars, where $0 \le x \le 200$. Draw the budge line for this household.

2　(10pt) There are two players playing a game. Player 1 has two strategies, U and D. Players 2 has three strategies, L, M and R. The payoff matrix is the following. What are the pure-strategy Nash equilibria?

Player 2

		L	M	R
Player 1	U	2,2	1,1	3,0
	D	1,1	1,1	0,1

Figure 1

3　(10pt) Consider a monopoly firm with the cost function $c(q) = \frac{1}{2}q^2 + 10$. The demand function is $D(p) = 200 - 2p$.

　　(1)　(5pt) What is the profit-maximizing output for this firm?

　　(2)　(5pt) What is the value of deadweight loss if the firm produces at the profit-maximizing output?

4　(10pt) Consider a lotter so that there is 0.5 probability of receiving 3600 dollars and 0.5 probability of receiving 1600 dollars. Suppose there is a person whose utility function is $U(x) = \ln x$, where x is money. Will he/she choose the lottery or 2600 dollars? Why?

5　(9pt) A firm has a production function $f(x_1, x_2) = x_1^{0.5} x_2^{0.5}$, where x_1 and x_2 are inputs. The prices of x_1 and x_2 are 1 and 2, respectively. Suppose x_1 is fixed at 16. What are this firm's variable cost function, fixed cost function, and total cost function? (Assume the firm produces y units of output. Derive the above cost functions as functions of y. 3 points for each correct answer.)

6　(6pt) Explain the following three assumptions on preferences: complete preference, reflexive preference, and transitive preference. (2 points for each correct answer.)

7　(25pt) Consider a market where two firms engage in quantity competition. (In other words, the Cournot competition.) Firm 1 produces q_1, and firm 2 produces q_2. Both firms have the cost function $C(q_i) = q_i^2$, where i = 1 or 2. The inverse demand function in this market is $P(Q) = A - Q$, where $A > 0$ and $Q = q_1 + q_2$.

　　(1) (10pt) Suppose each firm makes its own decision independently. What is quantity that each firm produces?

　　(2) (10pt) Suppose the firms can arrange an agreement to maximize the joint profit. Assume that $q_1 = q_2$. What is the profit-maximizing output that each firm produces?

　　(3) (5pt) If the agreement on part (2) is not binding (i.e., the firms may not need to commit to the agreement), can a firm profitably deviate from the agreement? (You need to show the work to get full credit.)

8　(20pt) Consider a voting model where there are three candidates, i, j, and k. Possible policy views can be represented on an interval between 0 and 1. There is a continuum of voters who are uniformly distributed between 0 and 1. The location of a voter represents' his/her policy view. The

candidates simultaneously announce their policy views. Let the announcements be x_i, x_j, and x_k. A voter will vote for the candidate that is closer to his/her policy view. When there are more than two candidates announcing the same policy view, the votes from the voters who consider the policy view the closest policy view will be divided equally for each of the candidates. When the votes for the leading candidates are in tie, there is no winner. The candidates' objectives are to win the election. For the following questions, you need to show the work to get full credit.

(1) (10pt) Can $x_i = x_j = x_k = \frac{1}{2}$ be a Nash equilibrium? If this is an equilibrium and if there is a winner, which candidate is the winner?

(2) (10pt) Can $x_i = x_j = \frac{1}{4}$ and $x_k = \frac{3}{4}$ be a Nash equilibrium? If this is an equilibrium and if there is a winner, which candidate is the winner?

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科目名稱：統計學【經濟所碩士班】

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%) Let X be a continuous random variable with density function $f(x) = 4x^3$, $0 \le x \le 1$. Let $U = X^2$. Find the density function of U. ■

2. (20%) Let (X, Y) be a continuous random vector with joint density function $f(x, y) = ce^{-x}e^{-2y}$, $0 \le x \le 2y < \infty$.

   (a). Find c.
   (b). Find $P(X \le Y)$. ■

3. (20%) Let X have density function $f(x) = 2x$, $0 < x < 1$. Find the median of X. ■

4. (20%) Let $X_1, ..., X_n$ be independent, with $X_i \sim N(\theta, \theta^2)$. Find the MLE of θ. (Be sure to verify which root of the quadratic leads to the maximum.) ■

5. (20%) Consider a random sample Y_i, $i = 1, ..., n$ from a standard t distribution with ν degree of freedom. Provided that $\nu > 2$, a standard t variables has population mean 0 and variance given by $\mu_2' = E(Y_t^2) = \frac{\nu}{(\nu-2)}$. Use method of moment to find the estimation of ν. ■

End of Questions.