

考試科目	個體經濟學	所別	經濟系	考試時間	5月24日 星期六 第一節
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所有題目必答 (50%)

1. 假設四產業之產量分配如右:

Share	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Industry I	60	10	5	5	5	5	5	5	0	0
Industry II	20	20	20	20	20	0	0	0	0	0
Industry III	100/3	100/3	100/3	0	0	0	0	0	0	0
Industry IV	49	49	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

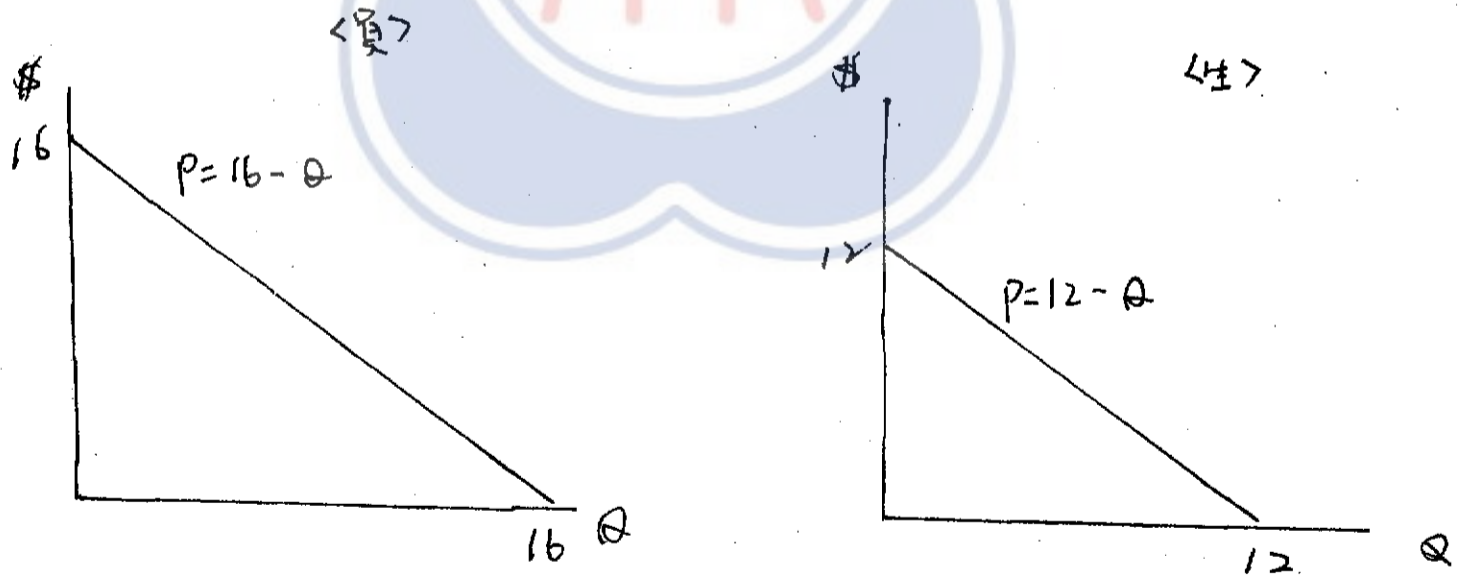
請由 CR4 及 Herfindahl-Hirschman Index 判斷那個產業最集中(10%)

2. 假設台北市停車管理處要拍賣 4 輛泡水車，且知道有兩位偏好相同之消費甲、乙，其個別需求量如下:

\$20000	1 輛
\$15000	2 輛
\$10000	3 輛
\$8000	4 輛

試說明在 English Auction 下, (a) 甲、乙之出價情形, (b) 管理處的報酬. (20%)

3. 政大餐廳在考慮推出員生優惠套票。一客牛排之 MC 為 4 元。消費者可分二群: 員, 生。老闆無法區別, 但知其需求量如下:



請問老闆要如何訂價使利潤最大? (20%)

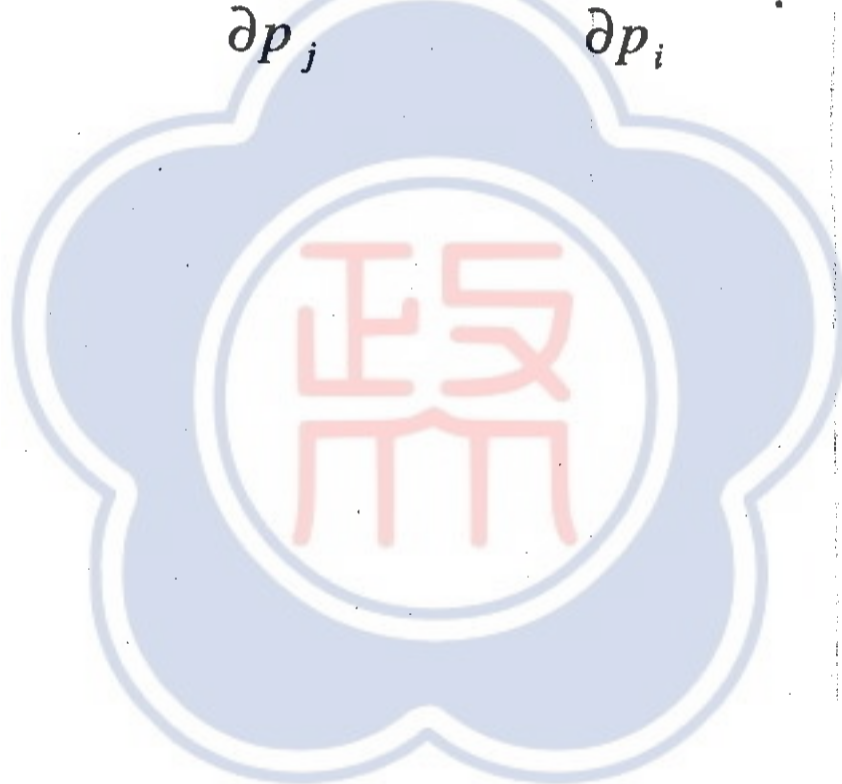
備	考	試 題 隨 卷 繳 交
命 題 委 員 :		(簽 章) 年 月 日

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4. (30%) Proof the following properties for an expenditure function (i.e. $e(p,u)$):
- Homogeneous of degree one in p .
 - Strictly increasing in u and nondecreasing in p_n for $n = 1, 2, \dots, N$.
 - Concave in p and u .
5. (10%) Suppose a function $E(p,u)$ has all the properties for an expenditure function. How do you recover the direct utility function (i.e. $u(x)$) associating with it? Explain the process in details.
6. (10%) Suppose the utility function is quasi-linear. Please show that

$$\frac{\partial x_i(p, m)}{\partial p_j} = \frac{\partial x_j(p, m)}{\partial p_i}$$



備	考試題隨卷繳交
命題委員：	(簽章) 年 月 日

考試科目	總體經濟學	所別	經濟研究所	考試時間	05月24日 星期六	第 二 節
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1. (25%)
 (a) (15%) What is the primary implication of the Lucas's critique? Explain with a complete rational expectations macroeconomic model.
 (b) (10%) Consider a small open economy where the real output is exogenous and prices are flexible. The money demand function depends upon the nominal interest rate and real income. Suppose the money demand function follows a log-linear form and can be expressed as : $m_t - p_t = -\eta i_{t+1} + \phi y_t$, where m_t is the money supply, p_t is the price level, i_t is the nominal interest rate and y_t is the aggregate real output. Foreign interest rate and price level are denoted as i_{t+1}^* and p_t^* . We also assume the purchasing power parity (PPP) and uncovered interest parity (UIP) conditions hold:

$$p_t = e_t + p_t^*,$$

$$i_{t+1} = i_{t+1}^* + E_t e_{t+1} - e_t$$

Derive the exchange rate in terms of current and expected macroeconomic fundamentals: $y_t, m_t, i_{t+1}^*, p_t^*$. Also use this model to explain the exchange rate determination puzzle.

2. (25%) Consider a real business cycle model as described below. We assume the population grows exogenously at rate n : $\ln N_t = \bar{N} + nt, n < \rho$. Technology follows: $\ln A_t = \bar{A} + gt + \tilde{A}_t$ where $\tilde{A}_t = \rho_A \tilde{A}_{t-1} + \varepsilon_{A,t}, -1 < \rho_A < 1$. The representative agent maximizes the expected value of

$$U = \sum_{t=0}^{\infty} e^{-\rho t} u(c_t, 1-l_t) N_t$$

where $c_t = C_t/N_t$ and $l_t = L_t/N_t$ are consumption and labor supply per capita. Suppose the instantaneous utility function, u_t , is given by

$$u_t = \ln c_t + b(1-l_t)^{1-\gamma} / (1-\gamma), b > 0, \gamma > 0.$$

We eliminate the government expenditure and assume there is 100% depreciation. Thus the evolution of the aggregate capital stock can be written as:

$$K_{t+1} = Y_t - C_t$$

- (a) (15%) Solve the saving rate and the leisure per person $(1-l_t)$. (Hint: the saving rate is a constant)
 (b) (10%) Do the results in part (a) match major features of consumption, investment and employment from empirical findings? Explain.

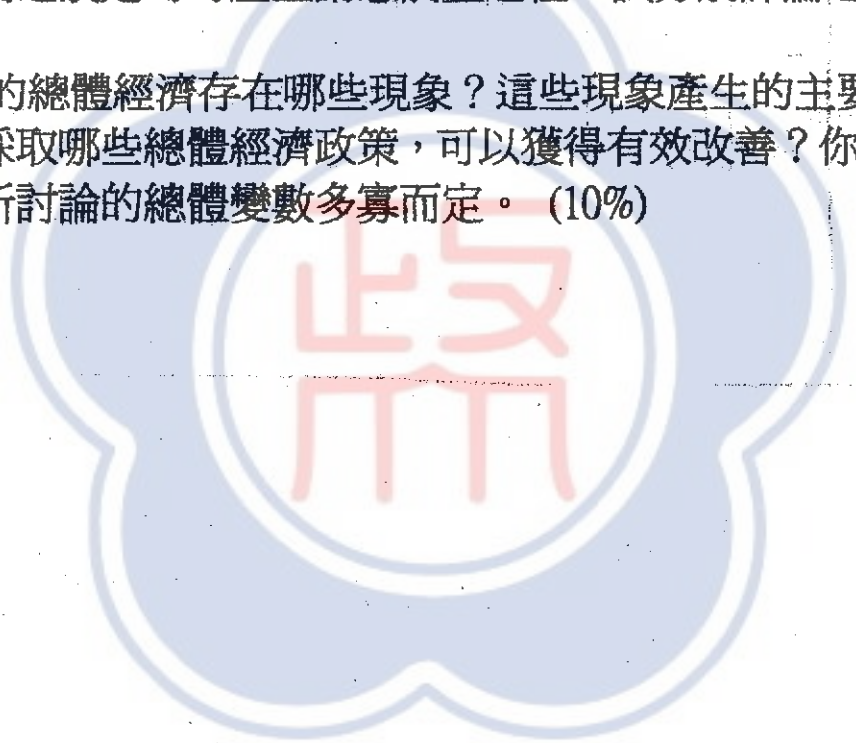
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命題委員：		(簽章)	年	月

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考試科目	總體經濟學	所別	經濟研究所	考試時間	5月24日 星期六	第二節
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3.

- a) 試分別建構單一部門和兩部門人力資本成長模型，說明在何種條件下可存在長期內生成長，並比較其動態調整過程(transitional dynamics)和平衡成長率(balanced growth)之差異。(20%)
- b) 從技術外溢(technology spillover)觀點，試建構二種內生成長模型，並說明其如何產生長期成長與其成長的特徵。(10%)
- c) AK內生成長模型或小型開放內生成長模型為何沒有動態調整過程？透過那些機制之設定可產生動態調整過程，試分別詳論之。(10%)
- d) 台灣目前的總體經濟存在哪些現象？這些現象產生的主要原因為何？政府應採取哪些總體經濟政策，可以獲得有效改善？你的答案完整與否將視你所討論的總體變數多寡而定。(10%)



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1. (20 points) Consider the model $y_t = \beta_1 x_{t1} + \beta_2 x_{t2} + u_t$, $\mathbb{E}(u_t) = 0$, $\mathbb{E}(u_t^2) = \sigma^2$, $\mathbb{E}(u_t u_s) = 0$. All variables have zero mean. If β_1 is estimated from the regression of y on x_1 with x_2 omitted, show that the resulting estimate is biased but has smaller variance than the estimate with x_2 included.
2. (30 points) Given a sample of $n_1 + n_2$ observations $y_1, y_2, \dots, y_{n_1}, y_{n_1+1}, y_{n_1+2}, \dots, y_{n_1+n_2}$. Let those observations be drawn independently from normal distributions with

$$y_i \sim N(\alpha, \sigma_0^2), \quad i = 1, 2, \dots, n_1,$$

$$y_i \sim N(\alpha + \beta, \sigma_0^2), \quad i = n_1 + 1, \dots, n_1 + n_2.$$

- (a) Derive the maximum likelihood (ML) estimators for α , β and σ_0^2 .
- (b) Derive the asymptotic distributions of the ML estimators you obtain in (a).
- (c) Please derive the Wald test statistic for $H_0: \beta = 0$.
3. (20 points) Consider the following model:

$$y_i = \mathbf{x}_i' \boldsymbol{\beta} + e_i, \quad e_i \sim N(0, \sigma_i^2),$$

where $\sigma_i^2 = g(\alpha_0 + z_1 \alpha_1 + \dots + z_p \alpha_p)$. Suppose we would like to test the null of homoskedasticity.

- (a) Write down your null hypothesis.
- (b) What large sample tests will you choose to test the hypothesis? State your testing procedure including your test statistic and its limiting null distribution.

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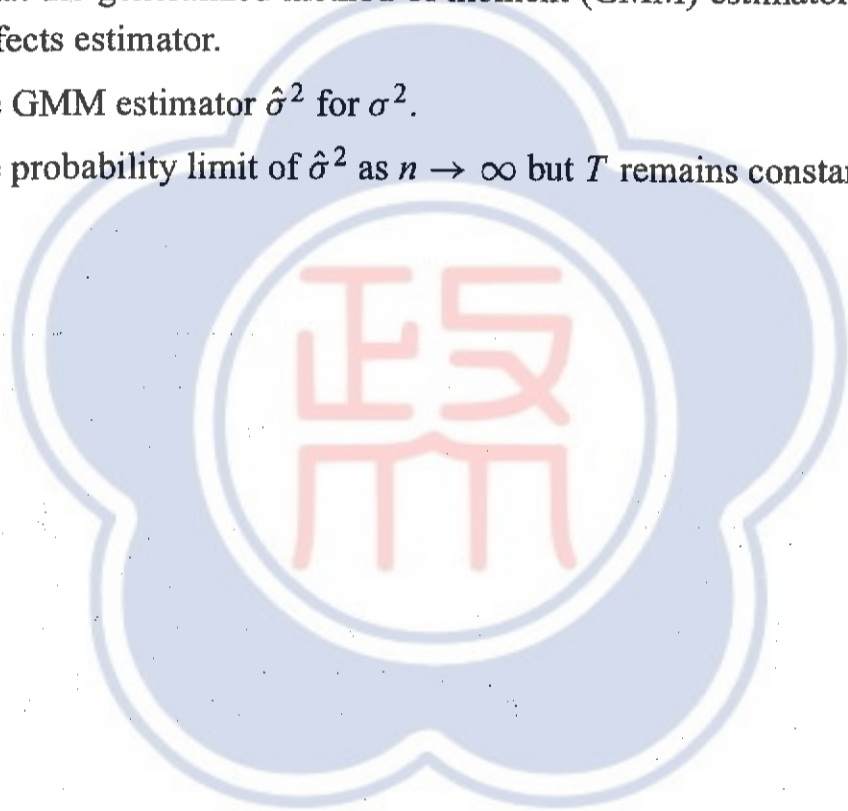
4. (30 points) Consider a simple panel data model

$$y_{it} = \mu_i + e_{it},$$

$$\mathbb{E}(e_{it}^2) = \sigma^2,$$

where the e_{it} are iid with $\mathbb{E}(\mu_i e_{it}) = 0, i = 1, \dots, n, t = 1, \dots, T$.

- (a) Show that the generalized method of moment (GMM) estimator for μ_i is \bar{y}_i , the fixed-effects estimator.
- (b) Find the GMM estimator $\hat{\sigma}^2$ for σ^2 .
- (c) Find the probability limit of $\hat{\sigma}^2$ as $n \rightarrow \infty$ but T remains constant.



備考	試題隨卷繳交
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Problem 1. Let \mathcal{L} be a topological vector space, X a convex and open subset of \mathcal{L} and a mapping
(20%) $u: X \rightarrow \mathbb{R}$

Prove that concavity implies continuity, And describe what will cause a contracting mapping?

Problem 2. Let $p, \ell \in \mathbb{R}^N$. Prove that $p(\ell) = \sum_{n=1}^N p_n \ell_n$ is a continuous linear function.
(20%)
And discuss what will happen if it is nonlinear function?

Problem 3. Consider a growth model:
(30%)

$$\max_{\{c_t, k_{t+1}\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t u[c_t]$$

subject to $c_t + k_{t+1} = f(k_t) \quad k_0 \text{ given}$

Show that (i) a solution to the problem exists, (ii) is unique and (iii) the solution is pareto optimal.

In order to do this, you need to check the following conditions

- Start by defining the commodity space (\mathcal{L}), the consumption possibility set (X) and the production possibility set (Y) in a suitable form
- Show that X and Y are closed and convex
- Show that Y has an interior point

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Problem 4. *The social planner maximization problem*

(30%)

$$\text{Max}_{\{C_t, K_{t+1}, Y_t\}} E_t \left[\sum_{i=0}^{\infty} \beta^i \frac{C_{t+i}^{1-\gamma}}{1-\gamma} \right]$$

$$\text{s. t. } Y_t = A_t^\alpha K_t^{1-\alpha}$$

$$K_{t+1} = (1-\delta)K_t + Y_t - C_t$$

(a) *Derive first order condition as: $C_t^{-\gamma} = \beta E_t \{C_{t+1}^{-\gamma} R_{t+1}\}$.*

At steady state (balanced growth path) of this economy, in which technology capital, output and consumption all grow at a constant common rate, the exogenous growth rate of the technology

$$G \equiv \frac{A_{t+1}}{A_t} \approx (1+g)$$

(b) *Find equilibrium ratios: $A/K, K/Y, C/Y$.*

(c) *Form a system of log-linear difference equations in technology, capital and consumption (Just show steps, NO details needed)*

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