教育部 111 年公費留學考試試題 96

科目：經濟學 (全二頁，第一頁)

※可使用一般計算機(限僅具備＋、－、×、÷、%、√、MR、MC、M+、M-運算功能)

一、 假設去年芒果的供給和需求如下：(總分 25 分)

$$Q^S=50P,\ Q^D=300-100P,$$

其中價格(P)與數量(Q)的單位分別為元/公斤和萬公斤。請回答以下問題：

(一) 去年的均衡價格與數量分別為何？(3 分)

(二) 今年由於沒有颱風侵襲，使得每個價格之下供給量都增加 150 萬公斤，請問今年芒果的供給為何？芒果的均衡價格和數量分別為何？(4 分)

(三) 承(二)，政府為了照顧果農決定以去年均衡價格的八成保證購買任何數量的芒果給 20 萬國軍食用，請問每個國軍將分得多少芒果？政府需要支出多少？(6 分)

(四) 承(三)，此時消費者剩餘增加或減少？生產者剩餘增加或減少？是否有絕對損失(deadweight loss)？如果有，有多少絕對損失？(6 分)

(五) 承(二)，且政府由保證去年價格的八成收購改為購買 15 萬公斤的芒果，請問均衡價格將變為多少？政府需要支出多少？(6 分)

二、 某廠商獨占 A、B 兩市的市場，需要選擇在兩個城市之間設立工廠從事生產，再將產品分別運至兩市銷售。A、B 兩市相距 40 公里，工廠和 A 市的距離為 d 公里，和 B 市的距離則為 40-d 公里。A、B 兩市消費者對商品的需求分別為：(總分 25 分)

$$P_A=210-2Q_A,\ P_B=160-3Q_B,$$

其中P_A, P_B, Q_A, Q_B分別為兩個市場的價格與需求量。商品的成本函數為：

$$C(Q)=20Q,$$

Q為產量。廠商將每單位產品由工廠運至 A 市的成本為每公里$1，至 B 市的運輸成本則為每公里$2。

(一) 廠商提供產品給 A、B 兩市消費者的邊際成本分別為何？(4 分)

(二) 廠商的利潤函數(profit function)為何？(3 分)

(接下頁)

(三) 廠商利潤極大時工廠的產量為何？銷售至 A、B 兩市的數量分別為何？工廠設在何處？(12 分)

(四) 廠商利潤極大時商品在兩市的價格與廠商的利潤分別為何？(6 分)

三、 請回答以下問題：(總分 25 分)

(一) 請描述 Solow 成長模型，並說明此一模型中經濟成長的主要來源為何？對經濟成長的解釋有何侷限性？相較於 Solow 成長模型，內生成長模型(endogenous growth model)有何優缺點？(9 分)

(二) 何謂「流動性陷阱」？流動性陷阱如何影響貨幣政策和財政政策的有效性？(8 分)

(三) 請以經濟學理論解釋近年來生育率下降的現象。(8 分)

四、 某國的生產函數為 $Y = 2000\sqrt{L}$ ，因此勞動需求為 $\frac{W}{P} = \frac{1000}{\sqrt{L}}$，其中Y為總產出，L為勞動量，W 為名目工資，P 為物價水準。該國的勞動供給為 $L = \frac{W}{P}$ ，目前的物價水準為 125。請回答以下問題：(總分 25 分)

(一) 請問長期時勞動市場的均衡實質工資($\frac{W}{P}$)和勞動雇用量為何？(4 分)

(二) 請寫出該國的長期總合供給函數。(3 分)

(三) 短期時勞工無法感受到物價變動，認為物價水準固定為 125。請說明短期總合供給函數為 $Y = 4000\sqrt[3]{P}$。(4 分)

(四) 承(三)，假設總合需求函數為 $Y = 40000 - 160P$，請問此時是否處於長期均衡？為什麼？(4 分)

(五) 承(三)，假設總合需求減少為 $Y = 26240 - 160P$，短期物價將如何變動？請問短期均衡時產出、物價水準和勞動雇用量分別為多少？(6 分)
(提示：短期均衡時$\sqrt[3]{P}$為一整數。)

(六) 承(五)，請問此時勞工的名目工資和實質工資各為何？(4 分)

教育部 111 年公費留學考試試題 97

科目：管理學 （全一頁）

※可使用一般計算機(限僅具備＋、－、×、÷、% 、√、MR、MC、M+、M-運算功能)

一、(總分 20 分)請討論矩陣式組織(matrix structure)之

(一)優點和缺點(10 分)；

(二)在何種情況下較適宜使用？(10 分)

二、(總分 20 分)請解釋：

(一)企業倫理(business ethics)(6 分)

(二)策略聯盟(strategic alliances)(6 分)

(三)何謂管理？(8 分)

三、(總分 20 分)在家工作(work from home, WFH)或混合式辦公模式(hybrid working model)等遠距工作方式將成常態，請討論此種新工作方式

(一)對主管的挑戰(10 分)；

(二)建議公司和主管的因應策略(或做法)。(10 分)

四、(總分 20 分)Entrepreneurship 之翻譯，在創業的情境中譯為創業精神，但在已營運一段期間的公司中則可譯為興業精神。請討論在已營運一段期間的公司中

(一)興業精神所代表的意義為何？(10 分)

(二)公司可採取哪些措施鼓勵興業精神？(10 分)

五、(總分 20 分)公司的主管可分為低階、中階及高階，所擔負的責任和所需的領導風格有所差異，請就低階主管和高階主管討論兩議題：

(一)工作內容和所須具備能力之差異(10 分)；

(二)因部屬特性和部屬工作內容所需具備領導風格之差異。(10 分)

（試題隨試卷繳回）

教育部 111 年公費留學考試試題 98

科目：統計學 （全三頁，第一頁）

※可使用一般計算機(限僅具備＋、－、×、÷、% 、√、MR、MC、M+、M-運算功能)

※以中文或英文作答均可，評分僅考量答題的正確性。

1. (40%) Let X_1, X_2 be two independent exponential random variables with means $1/\lambda_1, 1/\lambda_2$.

(a) (5%) Find the probability density function of Y defined by

$$Y = \begin{cases} X_1, & \text{with probability } p; \\ X_2, & \text{with probability } 1-p. \end{cases}$$

(b) (5%) Find the probability density function of $Z = X_1 + X_2$.

(c) (5%) Show that $X = \lambda_1 X_1 - \lambda_2 X_2$ follows a Laplace distribution with density function given by

$$f(x) = \frac{1}{2} e^{-|x|}.$$

Moreover, derive its moment generating function $\mathrm{E}[e^{tX}]$.

(d) (5%) Given below is the density function of a random variable X which follows a generalized version of Laplace distribution

$$f(x) = \frac{\lambda}{2} e^{-\lambda|x-\mu|}.$$

Find its mean and variance.

(e) (5%) Suppose that $X_1, \cdots, X_n$ are samples taken from a population that follows a Laplace distribution defined in (d). Find the method of moments (MM) estimators of μ and λ, denoted by $\widehat{\mu}_{\mathrm{MM}}$ and $\widehat{\lambda}_{\mathrm{MM}}$ (using the first two moments).

(f) (5%) Following (e), find the maximum likelihood (ML) estimators of μ and λ, denoted by $\widehat{\mu}_{\mathrm{ML}}$ and $\widehat{\lambda}_{\mathrm{ML}}$.

(g) (5%) Consider the random variable X in (d). Show that $W = |X - \mu|$ follows an exponential distribution with mean $1/\lambda$.

(h) (5%) Suppose that $W_1, \cdots, W_n$ are samples taken from a population that follows an exponential distribution as described in (g). Find the sampling distribution of their sample mean $\bar{W} = \sum_{i=1}^{n} W_i/n$. (You need to specify what distribution it is and its parameters.)

2. (30%) Consider two normal random variables $X \sim \mathrm{N}(\mu_1, \sigma_1^2)$, $Y \sim \mathrm{N}(\mu_2, \sigma_2^2)$ with correlation coefficient ρ. (In other words, they follow a bivariate normal distribution $\mathrm{BN}(\mu_1, \sigma_1^2, \mu_2, \sigma_2^2, \rho)$.)

(a) (4%) Does $\rho = 0$ imply that X and Y are independent? Give your explanation.

(b) (4%) Let $x_1, \cdots, x_n$ be n samples from X and $y_1, \cdots, y_m$ be m samples from Y. State how you test the equality of their mean and variance:

- H_0: $\mu_1 = \mu_2$ (against H_1: $\mu_1 \neq \mu_2$);
- H_0: $\sigma_1^2 = \sigma_2^2$ (against H_1: $\sigma_1^2 > \sigma_2^2$).

（接下頁）

For each hypothesis, describe the test statistic and the probability distribution (with its parameters) followed by the test statistic.

(c) (4%) Let $(x_1, y_1), \cdots, (x_n, y_n)$ be n sample pairs from the random vector (X, Y). We use a simple regression $y = \alpha + \beta x + u$ (where u is the error term) to model the relation between X and Y, and use ordinary least square (OLS) method to obtain the estimated coefficients $\hat{\alpha}$ and $\hat{\beta}$. The fitted model becomes

$$\hat{y} = \hat{\alpha} + \hat{\beta} x.$$

Let $\hat{u}_i = y_i - \hat{y}_i$, $i = 1, \cdots, n$ denote the residuals. Show that

$$\sum_{i=1}^{n} \hat{u}_i = 0, \quad \sum_{i=1}^{n} x_i \hat{u}_i = 0.$$

(d) (4%) Describe the relation between ρ and the estimated coefficient $\hat{\beta}$. In addition, describe how you test the hypothesis H_0: $\beta = 1$ against H_1: $\beta > 1$.

(e) (4%) Let R^2 denote the coefficient of determination in the regression model in (c), and let $\hat{\rho}$ denote the sample correlation coefficient calculated from the sample pairs $(x_i, y_i), i = 1, \cdots, n$. Discuss whether the three quantities R^2, $\hat{\rho}^2$, ρ^2 are close to each other, equal to each other, or else.

(f) (5%) Define two random variables Z and U as below

$$Z = \frac{X - \mu_1}{\sigma_1}, \quad U = Z^2.$$

What are the probability distributions followed by Z and U? Find their correlation coefficient. Are they correlated? Are they independent?

(g) (5%) Let $V \sim \mathrm{N}(0, 1)$ be a standard normal random variable independent of X and Y. We intend to construct a new random variable W in the following way

$$W = a + bX + cV$$

such that W is equivalent to Y in distribution (i.e., (X, W) has the same joint distribution as (X, Y)). How do you find a, b, c?

3. (30%) Suppose that the true population model for y and x is

$$y = \beta_0 + \beta_1 x + \beta_2 x^2 + u \tag{1}$$

where the error term u satisfies the standard linear regression conditions (zero mean, uncorrelated with x, no heteroskedasticity, etc). In this problem, we further assume that $x > 0$ and $\beta_2 > 0$.

(a) (5%) If the quadratic term $(\beta_2 x^2)$ in (1) is omitted, the model is estimated as

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x.$$

We expect the estimated coefficient $\hat{\beta}_1$ to be biased (i.e. $\mathrm{E}[\hat{\beta}_1] \neq \beta_1$). Quantify the bias $\mathrm{E}[\hat{\beta}_1] - \beta_1$ and discuss whether it is positively biased ($\mathrm{E}[\hat{\beta}_1] > \beta_1$) or negatively biased ($\mathrm{E}[\hat{\beta}_1] < \beta_1$).

（接下頁）

(b) (5%) Assume in (1) that u does not have zero mean ($\mathrm{E}[u] = \alpha \neq 0$). Then, in the following estimated model

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x + \hat{\beta}_2 x^2,$$

are $\hat{\beta}_0, \hat{\beta}_1, \hat{\beta}_2$ biased? Give your reason and quantify the bias if any.

Now, suppose that $\beta_1 = 0$ and the true population model reduces to

$$y = \beta_0 + \beta_2 x^2 + u, \tag{2}$$

with u still satisfying the standard conditions, and $x > 0$, $\beta_2 > 0$.

(c) (5%) Suppose that we have obtained the following estimated model

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_2 x^2.$$

Now we change y to $y' = a + by$ and change x to $x' = cx$, and regress y' on x' to obtain a new estimated model as below

$$\hat{y}' = \tilde{\beta}_0 + \tilde{\beta}_2 (x')^2.$$

How are $\tilde{\beta}_0, \tilde{\beta}_2$ related to $\hat{\beta}_0, \hat{\beta}_2$?

(d) (5%) Suppose that an additional variable $z = x^3$ is added to the model, and the estimated model becomes

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_2 x^2 + \hat{\beta}_3 z.$$

Discuss how the inclusion of z influences the standard error of $\hat{\beta}_2$.

(e) (5%) Following (d), if z is not included but instead another variable $w = 3x^2 + 5$ is included, and the estimated model becomes

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_2 x^2 + \hat{\beta}_4 w.$$

Discuss the consequence of the inclusion of w.

(f) (5%) Suppose that in the true model (2), there is heteroskedasticity in u which is described by $\mathrm{Var}(u|x) = \sigma^2 x^2$. Are $\hat{\beta}_0, \hat{\beta}_1, \hat{\beta}_2$ biased? What problem might it cause? How do you alleviate the problem?

教育部 111 年公費留學考試試題 99

科目：會計學 （全二頁，第一頁）

※ 可使用一般計算機(限僅具備＋、－、×、÷、% 、√、MR、MC、M+、M-運算功能)

※ 以中文或英文作答均可，評分基準相同。

I. Anna Banana Company would like to estimate how long it will take to realize cash from its ending inventory. For this purpose, the following data are submitted:

Accounts receivable, less allowance for doubtful accounts of $60,000	$ 1,120,000
Ending inventory	1,360,000
Net sales	8,700,000
Cost of goods sold	7,200,000

Required: Estimate how long it will take to realize cash from the ending inventory. (10%)

II. Northeast Car Rental in Japan is considering two alternatives for the financing of a purchase of a fleet of cars. These two alternatives are:

1. Issue 120,000 ordinary shares at ¥45 per share. (Cash dividends have not been paid nor is the payment of any contemplated.)
2. Issue 10%, 10-year bonds at par for ¥5,400,000.

It is estimated that the company will earn ¥1,600,000 before interest and taxes as a result of this purchase. The company has an estimated tax rate of 30% and has 180,000 ordinary shares outstanding prior to the new financing.

Required: Compare two alternatives of financing---issuance of ordinary shares vs. issuance of bonds. (20%)

III. An item of equipment acquired on January 1 at a cost of $50,000 has an estimated life of five years and an estimated salvage of $10,000.

Required

a. From a management perspective, among the straight-line method, declining-balance method, and sum-of-the-years'-digits method of depreciation, which method should be chosen for the financial statements if income is to be at a maximum the first year? Which method should be chosen for the income tax returns, assuming that the tax rate stays the same each year? Explain and show computations. (6%)

b. Is it permissible to use different depreciation methods in financial statements than those used in tax returns? (4%)

IV. Saunders Company has recently become aware of the large total discounts on its orders and would like to know the impact on profit. The company computed its operating profit as follows:

Net sales after discounts	$200,000
Variable costs	80,000
Contribution margin	$120,000
Fixed costs	70,000
Operating profit	$50,000

（接下頁）

Required

(a) Suppose Saunders could reduce its sales discounts to produce a 10% increase in net revenues but no changes in variable or fixed costs. By what percent would operating profits increase? How does this percentage compare to the percentage increase in net sales revenue? (10%)

(b) Refer to the original information in this problem. Suppose Saunders' salespeople discount sales another 2%, with no change in variable or fixed costs. By what percent would operating profits decrease? How does this percentage compare to the percentage increase in sales discounts? (10%)

(c) Consider the ratio of operating profit to sales. How does this ratio relate to the percentage change in operating profit, for a given percentage change in the net sales revenue? (10%)

V. Define each of the following terms：(30%)

a) Acceptable risk of assessing control risk (ARACR) too low (3%)
b) Monetary unit sampling (MUS) (3%)
c) Systematic sample selection (3%)
d) Difference estimation (3%)
e) Audit failure (3%)
f) Business failure (3%)
g) Audit risk (3%)
h) Analytical procedures (3%)
i) Competence of evidence (3%)
j) Confirmation (3%)

教育部 111 年公費留學考試試題 100

科目：財務理論 (全二頁，第一頁)

※可使用一般計算機(限僅具備＋、－、×、÷、%、√、MR、MC、M+、M-運算功能)

一、(總分 20 分)

(一) 說明公司發行債務籌資會引發的代理問題(Agency problems)。(7 分)

(二) 說明何謂資本結構理論中的融資順位理論(Pecking order theory)，以及此理論的經濟直覺。(7 分)

(三) 許多實證研究發現：公司進行現金增資(Seasoned equity offering, SEO)之前一年的股票超額報酬高，但現金增資後三年的股票超額報酬低。請為此現象提出合理的解釋。(6 分)

二、(總分 20 分)

(一) 說明 Fama 與 French 兩位學者於 2015 年所提出的五因子模型(Fama-French five-factor asset pricing model)中五種風險因子(Risk factors)的定義為何，以及為何這些變數適合作為風險因子。(10 分)

(二) 以上述的五因子模型為基礎，若要再加入一種新的風險因子，你會加入什麼風險因子？扼要說明答案。(5 分)

(三) 上述五因子模型中，若要刪除一種風險因子，你會刪除其中哪一種風險因子？扼要說明答案。(5 分)

三、(總分 20 分)

(一) 考慮一 Put-call parity 可成立的環境。說明為何在此環境中，對於股票的美式買權(American call option)來說，若權利到期之前標的股票沒有發放現金股利，則買權持有者不會提早執行權利。(10 分)

(二) Black-Scholes 歐式買權(European call option)的價值公式中有五個參數。說明每一個參數的值變高時會如何影響買權價值，並扼要解釋答案的經濟直覺。(10 分)

(接下頁)

教育部 111 年公費留學考試試題 100

科目：財務理論 (全二頁，第二頁)

四、(總分 20 分)

(一) 說明公司實踐企業社會責任(Corporate social responsibility, CSR)可以經由哪些管道提高公司股權價值。(10 分)

(二) 說明公司聘任過度自信(Overconfident)的高階經理人會經由哪些管道影響公司股權價值。(10 分)

五、(總分 20 分)

(一) 傳統經濟學的理論模型假設人們具有理性信念(Rational beliefs)，即當收到新資訊時，人們會立即根據貝式法則(Bayes' rule)正確更新對未來出象(Future outcomes)的信念。行為財務學(Behavioral finance)的理論文獻對於人們的信念提出多種異於傳統經濟學的假設。舉出你認為其中最重要的兩種，並針對每一種假設，舉出一種具備該假設之理論模型可以解釋的財務現象。(12 分)

(二) 有關股票首次公開發行(Initial public offering, IPO)的異常現象之一是 IPO 之後五年內股票長期報酬不佳。針對此現象，請提出兩種行為財務學的解釋。(8 分)

(試題隨試卷繳回)

教育部 111 年公費留學考試試題 101

科目：國際經濟學 **（全二頁，第一頁）**

※可使用一般計算機(限僅具備＋、－、×、÷、% 、√、MR、MC、M+、M-運算功能)

一、 簡答題（總分 24 分）

（一）請說明「要素價格均等定理」(Factor price equalization theorem)。請舉出兩種情形會讓此一均等定理不成立。(8 分)

（二）何謂「水平」對外直接投資（Horizontal FDI）？何謂「垂直」對外直接投資（Vertical FDI）？請說明廠商在進行兩類型投資時其著眼點各自為何？（6 分）

（三）根據 Vernon（1966）所提出之產品循環理論（Product cycle theory），產品依其生命周期可分成三個階段：新產品階段、產品成熟階段、產品標準化階段。假設有兩類型國家：已開發（技術先進）國家與開發中（技術接收）國家，請說明產品在不同生命周期階段於兩種類型國家的生產分布情形。(10 分)

二、 請以圖形或數學式回答以下有關關稅與配額的問題（總分 26 分）

（一）請利用部分均衡分析法（partial equilibrium analysis）比較關稅對小國與大國的福利效果。(可以令國內供給曲線為 S_H、國內需求曲線為 D_H、國外供給曲線為 S_F、國外需求曲線為 D_F、原本均衡價格為 P_0、與從量關稅 t。)（10 分）

（二）假設本國為一小國，同時商品市場與配額拍賣市場皆為完全競爭。請說明何謂關稅與配額的等價性。(可以沿用（一）小題的設定，並令國內配額為 Q_H。)(8 分)

（三）儘管（二）小題證明了關稅與配額的等價性，但現實上兩者的經濟效果仍存在相當大的差異。試論之。(此小題可單純用文字說明概念。)(8 分)

（接下頁）

教育部 111 年公費留學考試試題 101

科目：國際經濟學 **（全二頁，第二頁）**

三、過去十多年來中國資本市場逐漸改革開放，帶來高經濟成長，但在近期因新冠疫情使中國經濟疲軟。中國人民銀行透過降息與降低法定存款準備率來救經濟，但在強勢美元指數的帶領下離岸人民幣依舊直奔 7 的整數關卡。為了能抑制人民幣的持續貶值，中國人行甚至在 9 月 5 日祭出降低美元存款準備率政策。請問在這樣的背景下，欲透過貨幣政策來解救經濟，但又想穩住人民幣匯率，這樣的做法可能存在什麼問題？（25 分）

四、（總分 25 分）2019 年 8 月份新臺幣開始由貶值轉為升值後，引發學者開始注意臺灣經濟可能出現荷蘭病（the Dutch disease），也引來部分媒體關注此議題。請問荷蘭病的起源與成因？（10 分）為何學者認為臺灣會出現荷蘭病？（10 分）你認為應該如何解決？（5 分）

（試題隨試卷繳回）