



1. (20%) Suppose 10% of Lehman Brothers' financial instruments are known to contain pricing errors. If 6 derivatives pricing models are selected at random, with replacement, what is the probability that
 - (1) None of those selected contains an error?
 - (2) Exactly 2 of those selected contain errors?
 - (3) At most 2 of those selected contain errors?
 - (4) At least 2 of those selected contain errors?
2. (5%) Please explain in details the 'Central Limit Theorem' with examples.
3. (5%) Please define and differentiate 'Estimator' and 'Estimates' with examples.
4. (20%) Please define and derive the 'Moment generating Function' of normal distribution. How to measure 'Skewness' and 'Kurtosis' of normal distribution with moment?
5. (10%) A study stated that if a person chewed gum, the average number of sticks of gum he chewed daily was 8. To test the claim, a researcher selected a random sample of 36 gum chewers and found the mean number of sticks of gum chewed per day was 9. The standard deviation of the population is 1. At $\alpha = 0.05$, is the number of sticks of gum a person chews per day actually greater than 8?
6. (10%) The average income of 15 families who reside in a large city is \$62456. The standard deviation is \$9652. The average income of 11 families who reside in a rural area is \$60213, with a standard deviation of \$2009. At $\alpha = 0.05$, can it be concluded that the families who live in the cities have a higher income than those who live in the rural areas?
7. (10%) For a regression model without intercept, $y = \beta x + u$, derive the OLS estimator of β . Are there any assumptions need to be assumed?
8. (10%) A random sample of 16 observations was selected from each of four populations. A portion of the ANOVA table is

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Treatments			400	
Error				
Total	1500			

 - a. Provide the missing entries for the ANOVA table.
 - b. At the $\alpha = 0.05$ level of significance, can we reject the null hypothesis that the means of the four populations are equal?
9. (10%) Which of the following can cause OLS estimators to biased?
 - a. Heteroskedasticity
 - b. Omitting an important variable
 - c. A sample correlation coefficient of 0.95 between two independent variables both included in the model



國立雲林科技大學 104 學年度
碩士班招生考試試題

系所：財金系、環安系、工管系
科目：經濟學

本試題共有六大計算題，每題的配分如各題的開頭所顯示。

1. Suppose that a firm's production function is $Q=LK^2$. The per-unit prices of inputs L and K are \$60 and \$5, respectively.
 - a. (10 points) Determine the optimal combination of inputs and the minimum cost level if the firm wants to produce 3,888 units of output.
 - b. (10 points) The firm chooses the combination of (L, K) as $(12, 18)$ in order to produce 3,888 units of output. As a result, only 3,000 units of output are produced. Please evaluate the firm's allocative and technical efficiency, respectively.

2. The AA Company manufactures product X selling for \$2.98 each. Sales have averaged 10,000 units per month during the last year. Recently AA's closest competitor, BB Company, cut its prices on similar product from \$3.49 to \$2.59. AA noticed that its sales declined to 8,000 units per month after the price cut.
 - a. (5 points) What is the arc cross elasticity of demand between AA's and BB's products?
 - b. (10 points) If AA knows the arc price elasticity of demand for product X is -2.2 , what price would they have to charge in order to obtain the same level of sales as before BB's price cut?

3. (15 points) Two companies (A and B) are duopolists that produce identical products. Demand for the products is given by the following demand function:

$$P = 10,000 - Q_A - Q_B,$$
 where Q_A and Q_B are the quantities sold by the respective firms and P is the selling price. Total cost functions for the two companies are:

$$TC_A = 300,000 + 400Q_A + .5Q_A^2 \text{ and } TC_B = 100,000 + 200Q_B + Q_B^2$$
 Assume that the firms form a cartel to maximize total industry profits. Determine the optimum output and selling price for each firm.



4. Assume that an economy is characterized by the following equations:

$$C = 100 + \left(\frac{2}{3}\right) \cdot (Y - T)$$

$$T = 600$$

$$G = 500$$

$$I = 800 - \left(\frac{50}{3}\right) \cdot r$$

$$\left(\frac{M^s}{P}\right) = \left(\frac{M^d}{P}\right) = 0.5 \cdot Y - 50 \cdot r$$

Where C denotes consumption, Y denotes output, T denotes taxes, G denotes government spendings, I denotes investment, r denotes interest rate, M^s denotes money supply, M^d denotes money demand, and P denotes price.

- (4 points) Write the numerical IS curve for this economy, showing Y as a numerical function of r and other exogenous variables of this model.
 - (4 points) Write the numerical LM curve for this economy, showing r as a function of Y and other exogenous variables of this model.
 - (8 points) Solve for the equilibrium values of Y and r , and the corresponding consumption, and investment, assuming $P=1$ and $M=1200$. How do they change when $P=2$?
 - (4 points) Write the numerical aggregate demand curve for this economy, expressing Y as a function of P and other exogenous variables of this model.
5. Assume that in a small open economy with full employment, consumption depends only on disposable income. National saving is 300, investment is given by $I = 400 - 20 \cdot r$, where r is the real interest rate in percent, and the world interest rate is 10 percent.
- (4 points) If government spending rises by 100, does investment change? What is the level of investment after the change?
 - (4 points) Does the trade balance change if government spending rises by 100? If it changes, does it increase or decrease, and by how much?
 - (4 points) Does net capital outflow change if government spending rises by 100? If it changes, does it increase or decrease, and by how much?
 - (4 points) Will the real exchange rate rise, fall, or remain constant as a result of the change in government spending?



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6. Consider an economy where savings follow the rule of thumb that they are a constant fraction s of income, i.e. $S_t = s \cdot Y_t$ with $s \in (0, 1)$. The production function is $Y_t = A_t \cdot L^{1/2}$, where Y denotes output, A denotes technology, L denotes labor, and the labor force is fixed at $L=1$. The growth rate of productivity is g , i.e. $A_{t+1} = (1+g) \cdot A_t$, with $A_0 = 1$. The government spends G_t each period and collects a lump-sum tax of T_t . The economy exists for three periods $t = 0, 1, 2$.
- (2 points) Find the path for private savings $S_t^{priv} = Y_t - T_t - C_t$ and public savings $S_t^{gov} = T_t - G_t$ if $G_t = T_t = 0$ for all t . (i.e. express private savings as a function of s and g .)
 - (2 points) Find the path for private savings if government spending is fixed at a fraction $p \in (0, 1)$ of GDP and the government is running a balanced budget every period. (i.e. express private savings as a function of s and g .)
 - (6 points) Now consider the case where the government spends $G_0 = p \cdot Y_0$ at period 0 and zero in all other periods, and collects taxes $T_2 = p \cdot Y_2$ in period 2 and zero in all other periods. Find private and public savings at each period. (i.e. express private and public savings at each period as a function of s , p and g .)
 - (2 points) Is there Ricardian equivalence in this economy?
 - (2 points) Now assume that aggregate savings S is allowed to depend on G (as well as Y as before.) Find a dependence that S must have on G , so that Ricardian equivalence holds in this economy.