

考 試 科 目	初等會計學	系 別	財政學系 二年級	考 試 時 間	7 月 8 日(星期五) 第一節
---------	-------	-----	----------	---------	------------------

一、中正公司於民國 100 年 1 月 1 日出售公司債，面額 \$400,000，並採利息法攤銷該應付公司債之折、溢價。此公司債於民國 100 年 1 月 1 日發行，105 年 1 月 1 日到期，中正公司於每年 12 月 31 日支付利息。下列為中正公司第一期公司債攤銷表的相關資料：

期數	利息支付數	利息費用	溢(折)價攤銷	未攤銷溢(折)價	帳面價值
發行				?	\$439,926
1	\$40,000	\$35,194	?	?	?

試依據上述資料，回答下列問題：

- (1) 公司債的票面利率為何？(2%)
- (2) 發行日的市場利率為何？(2%)
- (3) 試做公司債發行分錄。(4%)
- (4) 試做民國 102 年 12 月 31 日之付息分錄。(4%)
- (5) 倘中正公司原採直線法攤銷公司債發行之折、溢價，試做民國 103 年 12 月 31 日之付息分錄。(4%)

二、果夫公司民國 100 年 12 月 31 日之股東權益內容如下：

10%累積特別股，面值\$100 (核准 50,000 股，發行在外 15,000 股)	\$ 1,500,000
普通股，面值\$10 (核准 100,000 股，發行 50,000 股，庫藏股 2,000 股)	500,000
特別股溢價	400,000
普通股溢價	360,000
保留盈餘	300,000
合計	\$ 3,060,000
減：庫藏股 (2,000 股，按成本計)	(32,000)
股東權益總計	\$ 3,028,000

已知特別股的收回價格為\$125，並積欠二年的股利而未予發放。試計算特別股與普通股的每股帳面價值。(10%)

考 試 科 目	初等會計學	系 別	財政學系二年級	考 試 時 間	7 月 8 日(星期五) 第一節
---------	-------	-----	---------	---------	------------------

三、道藩公司民國98年至100年帳列稅前淨利分別為\$300,000、\$600,000及\$800,000。100年底經會計師查帳結果發現下列事項：

- (1) 應收帳款原採銷貨百分比法提列壞帳，三年來壞帳之提列金額無誤，唯99年中沖銷某客戶帳款\$13,000時，借：壞帳費用；貸：應收帳款。
  - (2) 存貨採永續盤存制，98、99、100年底各有\$5,000、\$13,000及\$10,000起運點交貨之在途商品，未計入期末存貨，應付帳款與進貨亦未入帳。
  - (3) 99年7月1日購入某項設備時，其安裝費\$10,000誤記為費用，該設備估計可用五年，採直線法提列折舊（假設該設備殘值為\$0）。
  - (4) 年底之預收貨款均未予調整，98年至100年各年底應有之預收貨款分別為\$30,000、\$20,000及\$25,000。
  - (5) 公司帳上漏列應收租金，98年至100年各年底應有之應收租金分別為\$6,000、\$12,000及\$8,000。
- 試作：

- (一) 計算道藩公司民國98年、99年、100年之正確稅前淨利（18%）。
- (二) 假設道藩公司民國100年已結帳，試為以上錯誤作一合併之更正分錄（不考慮所得稅）（8%）。

四、志希公司民國99年底資產負債表資料如下：

現金	\$ xxx	應付帳款	\$1,650,000
應收帳款	1,180,000	應付公司債	1,100,000
存貨	767,000		
土地	330,000	普通股股本	1,980,000
機器設備	2,310,000	保留盈餘	484,000
減：累計折舊	(451,000)		
專利權	440,000		
	<u>\$5,214,000</u>		<u>\$5,214,000</u>

又民國100年之交易資料如下：

- (1) 淨利 \$506,000
- (2) 民國100年期末現金餘額 \$1,012,000
- (3) 機器設備之折舊 \$132,000
- (4) 機器設備（成本 \$220,000，累計折舊 \$88,000）以 \$110,000 出售，且另支付現金 \$220,000 購買機器設備
- (5) 專利權攤銷 \$55,000
- (6) 應收帳款及存貨分別增加 \$165,000 及 \$154,000
- (7) 應付帳款增加 \$143,000

考 試 科 目	初等會計學	系 別	財政學系二年級	考 試 時 間	7月8日(星期五) 第一節
---------	-------	-----	---------	---------	---------------

- (8) 發行應付公司債 \$550,000
- (9) 購買長期股票投資 \$176,000
- (10) 以\$109,000之成本購買庫藏股
- (11) 宣告並發放現金股利 \$320,000

試以上述資料計算民國99年底志希公司帳上之現金餘額(2%)，並以直接法編製志希公司民國100年之現金流量表(20%)。

五、風零公司民國100年8月底現金帳面餘額 \$834,000，銀行對帳單餘額 \$827,206。在檢查相關帳冊與資料後發現下列事項：

- (1) 公司於8月31日存入由第一銀行付款的支票一張 \$77,600，銀行尚未入帳。
- (2) 代收支票款 \$39,000，銀行於8月24日入帳，而風零公司尚未入帳。
- (3) 代收票據手續費 \$34，銀行於當日扣付，但公司未入帳。
- (4) 存款利息 \$3,600，銀行於8月31日入帳，公司未入帳。
- (5) 公司已開立但未兌現支票計有：

#331 \$10,000  
 #332 \$ 6,710  
 #347 \$11,530

試編製風零公司民國100年8月底之銀行調節表(16%)，及作成必要之調整分錄(4%)。

六、莊敬公司民國100年全年流通在外普通股10,000股，當年度之淨利為 \$290,000。莊敬公司另有流通在外之特別股2,000股，每股可優先發放現金股利 \$50。

學思公司民國100年之淨利為 \$100,000，當年年初流通在外普通股12,000股，直至11月1日該日增資發行3,000股。試計算：

- (1) 學思公司民國100年度之每股盈餘(3%)
- (2) 莊敬公司民國100年度之每股盈餘(3%)

考試科目	經濟學 A	系別	財政學系 二年級	考試時間	7 月 8 日 (二) 第二節
------	-------	----	----------	------	-----------------

## I. 單選題 (每題 3 分)

1. Suppose that the saving function is:  $S = \$500 + 0.2YD$  where  $YD$  is disposable income. What is the tax multiplier?  
(A) 0.8 (B) 0.2 (C) 0.25 (D) 4
2. John is a college student who is not working or looking for a job. John will be counted as  
(A) unemployed and in the labor force. (B) unemployed, but not in the labor force. (C) in the labor force, but not unemployed. (D) neither in the labor force nor unemployed.
3. When the NT dollar appreciates relative to the US dollar, then:  
(A) US goods become more expensive here. (B) Taiwan's goods become more expensive in US. (C) we tend to buy more from the US since we have a weak currency. (D) we sell more goods to the US.
4. Last year real GDP in the imaginary nation of Oceania was 561.0 billion and the population was 2.2 million. The year before, real GDP was 500.0 billion and the population was 2.0 million. What was the growth rate of real GDP per person during the year?  
(A) 8 percent. (B) 6 percent. (C) 4 percent. (D) 2 percent.
5. France and England both produce wine and cloth under conditions of constant opportunity costs. France can produce 150 units of wine if it produces no cloth, and 100 units of cloth if it produces no wine. England can produce 50 units of wine if it produces no cloth, and 100 units of cloth if it produces no wine. Using this information, we can conclude that:  
(A) France has a comparative advantage in cloth production. (B) England has a comparative advantage in cloth production. (C) France has a comparative advantage in both goods. (D) mutually beneficial international trade is not possible.
6. A cut in taxes \_\_\_\_\_, therefore shifting the aggregate demand curve to the \_\_\_\_\_.  
(A) decreases government transfers and consumption; right. (B) decreases the marginal propensity to save and consumption; left. (C) increases disposable income and consumption; right. (D) increases corporate profits and investment; left.
7. Which of the following would NOT be included in this year's GDP?  
(A) the production of a television show (B) the purchase of a new work truck (C) the hiring of a new police officer (D) your purchase of your neighbor's 2001 Toyota.

考試科目	經濟學 A	系別	財政學系 二年級	考試時間	7 月 8 日 (五) 第二節
------	-------	----	----------	------	-----------------

8. Stagflation is a combination of:  
(A) increasing unemployment and decreasing inflation. (B). decreasing unemployment and decreasing inflation. (C). increasing unemployment and increasing inflation. (D). decreasing unemployment and increasing inflation.
9. The Cozy Chair Company believes it can sell 200 chairs at \$200 per chair, or 300 chairs at \$150 per chair. What is the most likely estimate for the price elasticity of demand for Cozy Chairs?  
(A). 2.5. (B). 1.4. (C). 0.7. (D). 0.5.
10. Good X and Good Y are substitutes. Holding all other things constant, this means that when the price of Good X increases, the:  
(A) demand for Good X will increase. (B). demand for Good Y will increase. (C). demands for both Good X and Good Y will both increase. (D). demand for Good Y will decrease.
11. The principle of \_\_\_\_\_ marginal rate of substitution states that the more chocolate Susan consumes in proportion to coffee, the \_\_\_\_\_ coffee she is willing to substitute for another piece of chocolate.  
(A) diminishing; less. (B). diminishing; more. (C). increasing; less. (D). increasing; more.
12. Mary notices that the marginal utility of working with a tutor seems to fall with each hour the tutor helps her study. If Mary keeps the tutor until her grade actually begins to fall, her marginal utility will be:  
(A) positive, but rising more slowly. (B). zero. (C). negative. (D). immeasurable.
13. The following are four differences between monopoly and perfect competition. Which of these is *incorrect*?  
(A) A monopolist has market power while a perfect competitor does not. (B) Unlike a perfectly competitive firm, a monopoly can make positive economic profits in the long run. (C) A perfectly competitive firm may still make positive economic profits in the short run. (D) Monopoly profits can continue to exist in the long run, because the monopoly produces more and charges a higher price than a comparable perfectly competitive industry.
14. Sara wants to practice price discrimination in her bakery. Which of the following techniques should Sara *not* use?  
(A) discounts for people who buy more bread. (B). higher prices for people who buy on the day bread is baked and lower prices for people who place advance orders. (C). creating an annual fee for customers who want to shop at a discount in her store. (D). charging all consumers the same price for freshly baked goods.

考 試 科 目	經濟學 A	系 別	財政學系 二年級	考 試 時 間	7 月 8 日(五) 第二節
---------	-------	-----	----------	---------	----------------

15. The demand curve and its slope for a monopoly is:

- (A) above the  $MR$  curve and twice the  $MR$  curve. (B) above the  $MR$  curve and equal to one. (C) equal to the entire  $MR$  curve. (D) above the  $MR$  curve and one half of the  $MR$  curve.

16. A natural monopoly exists whenever a single firm:

- (A) is owned and operated by the federal or local government. (B) is investor-owned but has been granted the exclusive right by the government to operate in a market. (C) experiences economies of scale over the entire range of production that is relevant to its market. (D) has gained control over a strategic input of an important production process.

## II. 分析及演算題

1. (25%) In a market with demand  $p^d(x) = a - b * x$  and supply  $x^s(p) = c + d * p$ ,

- (a) Solve for the market equilibrium and discuss plausible ranges for parameters  $a$ ,  $b$ ,  $c$ , and  $d$ .  
 (b) At the current market equilibrium, compute the price elasticity of demand for commodity  $x$ .  
 (c) Provide the price level for which a government-installed price ceiling will be effective.  
 (d) Continued from (c), demonstrate how much excess demand or excess supply will be induced by this price ceiling?  
 (e) Suppose that commodity  $y$  is a complement for commodity  $x$ , in a diagram, illustrate the effect upon the market equilibrium specified in (a) when the market price for  $y$  falls significantly.

## 2. (27%) Solving a simple Keynesian Model

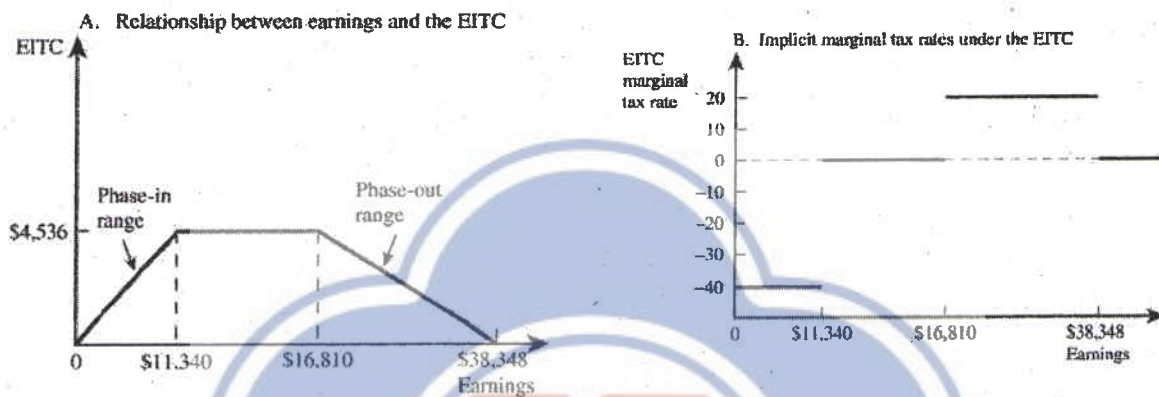
Consider a closed economy described by the following equations:  $Y = C + I + G$  where  $C = 80 + 0.6YD$ . Currently,  $I = \$250$  bn (billion),  $G = \$150$  bn and assuming that the tax rate equals 0 for now.

- (a) (5%) Decide the autonomous consumption, the induced consumption and MPC (marginal propensity to consume), the saving function and MPS (marginal propensity to save).  
 (b) (6%) What will be the equilibrium level of National Income?  
 (c) (6%) Illustrate by appropriate diagrams, when the aggregate planned expenditure is at the level of 1500 bn, what adjustment of the economy will take place?  
 (d) (10%) Suppose that the economists in this country have come to a consensus on the existence of a recessionary gap which is of the magnitude of 200 bn. To resort to a fiscal stimulus policy, Minister of Finance proposes to increase government spending by 160 bn, completely financed by an increase in income tax. Would this fiscal policy curb the recessionary gap, over-stimulate the economy, or under-stimulate the economy?

考試科目	微積分	系 別	財政學系二年級	考試時間	7月8日(五)第 四 節
<p>1. 已知 <math>y = \ln(e^x + 1)</math>，試求 <math>\frac{dy}{dx}</math> (10 分)</p> <p>2. 已知 <math>y = 5^{3x} \cdot 6^{7x}</math>，試求 <math>\frac{dy}{dx}</math> (15 分)</p> <p>3. 已知 <math>x^3 - x^2 + y^4 + 7 = 0</math>，試求 <math>\frac{dy}{dx}</math> (10 分)</p> <p>4. 試求 <math>\int_{-2}^2 \frac{y+1}{\sqrt{y^2+2y+2}} dy</math> (10 分)</p> <p>5. 試求 <math>\int_0^{\frac{\pi}{2}} x^2 \cdot \sin x dx</math> (10 分)</p> <p>6. 試求 <math>\int_1^3 \int_y^{y^2-1} (y-1) dx dy</math> (10 分)</p> <p>7. 已知 <math>f(x) = \frac{1}{1+x^2}</math>，試求 <math>x</math> 在 0 時的泰勒(Taylor)二階展開式 (15 分)</p> <p>8. 假設反需求函數為 <math>p = \frac{50}{x+5}</math>，反供給曲線為 <math>p = \frac{x}{10} + \frac{9}{2}</math>，則市場均衡時，消費者剩餘和生產者剩餘為何 (20 分)</p>					
備	註 試題隨卷繳交				

考試科目	財政學	系別	財政學系三年級	考試時間	7月8日(五)第一節
------	-----	----	---------	------	------------

- 1) (18%) In the 2008 Presidential Campaign, President Ma proposed to implement an Earned Income Tax Credit (EITC; 工作所得租稅扣抵) Program in Taiwan. To evaluate the effect of this proposal, let's consider the EITC Program in the U.S. as described in the figure below. Suppose an individual earns a fixed rate of \$8 per hour. Taking into account the EITC and ignoring aspects other aspects of the tax and transfer systems:



- a) (5%) How much do his or her earnings increase when the labor supply increases from 0 to 1,000 hours per year?
- b) (6%) How much do his or her earnings increase when the labor supply increases from 1,000 to 1,500 hours per year?
- c) (7%) How much do his or her earnings increase when the labor supply increases from 1,500 to 2,300 hours per year?
- 2) (18%) Suppose that Hannah's utility function is  $U_H = 3T + 4C$  and that Jose's utility function is  $U_J = 4T + 3C$ , where  $T$  is pounds of tea per year and  $C$  is pounds of coffee per year. Suppose there are fixed amounts of 28 pounds of coffee per year and 21 pounds of tea per year. Suppose also that the initial allocation is 15 pounds of coffee to Hannah (leaving 13 pounds to Jose) and 10 pounds of tea to Hannah (leaving 11 pounds of tea to Jose).
- a) (3%) What are the marginal rates of substitution of coffee for tea for Hannah and Jose?
- b) (3%) Draw an Edgeworth Box showing the initial allocation of these two goods. Moreover, for each individual, draw a set of three indifference curves and use an arrow to indicate the direction of utility increase.
- c) (3%) Is the initial allocation of coffee and tea Pareto efficient? Explain your answer.
- d) (3%) Consider an allocation that Hannah consumes all the coffee and tea while Jose consumes none



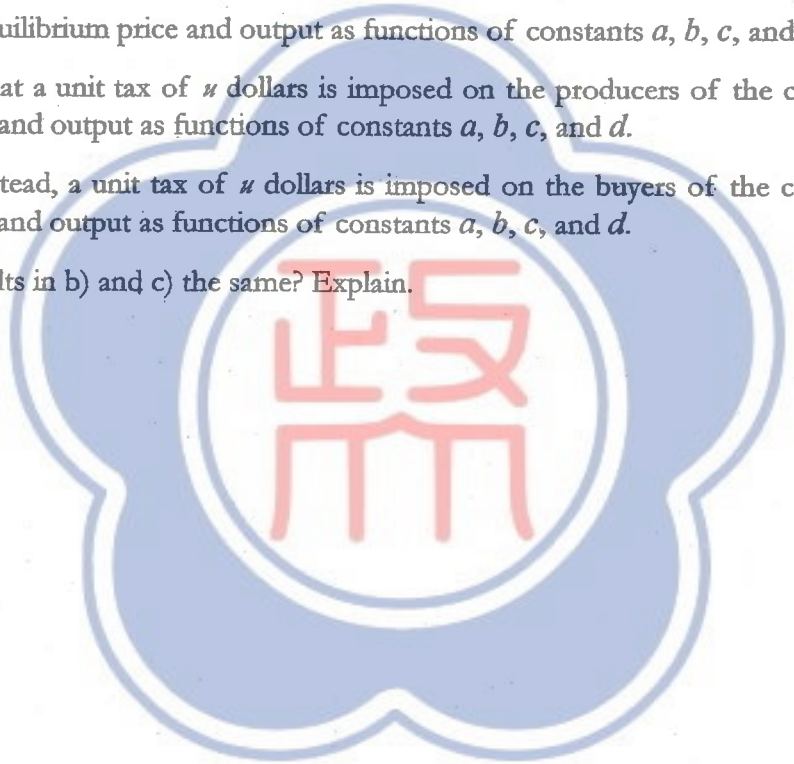
考試科目	財政學	系別	財政學系三年級	考試時間	7月8日(五)第一節
------	-----	----	---------	------	------------

of these two goods. Is this allocation Pareto efficient? Explain your answer.

- e) (6%) Derive the contract curve on the Edgeworth Box.
- 3) (14%) 請簡單回答以下關於兩稅合一問題:
- (2%) 所謂之兩稅合一為哪兩稅?
  - (2%) 兩稅合一有哪些方法?
  - (4%) 台灣公司組織之兩稅合一的作法為何? 其概念為何?
  - (2%) 何謂未分配盈餘稅?
  - (2%) 為何要加徵未分配盈餘稅?
  - (2%) 目前未分配盈餘稅之稅率為何?
- 4) (18%) Suppose there is no tax. Draw a figure of a two-period life-cycle model to explain the utility maximizing decision of a borrower. In your figure, make sure that you have the axes clearly indexed. Use the horizontal axis to denote present consumption and present income,  $C_0$  and  $I_0$ ; use the vertical axis to denote future consumption and future income,  $C_1$  and  $I_1$ . Let  $C_0, I_0, C_1$ , and  $I_1 > 0$ . Suppose an individual can borrow or lend at interest rate  $r$ .
- (4%) In your figure, show the initial endowment point and the utility maximizing point. What's the slope of the intertemporal budget constraint?
  - (7%) Consider a tax on the interest revenues with deductible interest payments. How does this change the slope of the constraint in a)? How does this change a borrower's saving decision? (Hint: compare income and substitution effects.) Will a borrower's utility level increase or decrease? Use a figure to illustrate your point.
  - (7%) Consider a tax on the interest revenues with non-deductible interest payments. How does this change the slope of the constraint in a)? Will a borrower change his or her saving decision? Use a figure to illustrate your point.
- 5) (18%) Ruth has a fixed income of  $I$  dollars, which she spends on only two commodities, barley and corn, with prices  $p_b$  and  $p_c$  respectively. Suppose now the government levies a tax at a percentage rate of  $t_b$  on barley so the barley price that Ruth faces becomes  $(1 + t_b)p_b$ . Use utility maximization (indifference) graphic analysis to answer the following questions. In your figures, use the horizontal axis to denote the quantity of barley and the vertical axis to denote the quantity of corn.
- (6%) Draw a figure to show that the barley tax makes Ruth worse off by an amount actually exceeds the revenues that the government generates.

考試科目	財政學	系別	財政學系三年級	考試時間	7月8日(五)第一節
------	-----	----	---------	------	------------

- b) (6%) Draw a figure to show that a lump sum tax that generates the same level of tax revenue as the barley tax makes Ruth better off.
- c) (6%) Can you give a situation of a barley tax that generates no excess burden? (Hint: the shape of the indifference curve.)
- 6) (14%) Suppose that the demand curve for a particular commodity is  $Q^D = a - bP$ , where  $Q^D$  is the quantity demanded,  $P$  is the price, and  $a$  and  $b$  are positive constants. The supply curve for the commodity is  $Q^S = c + dP$ , where  $Q^S$  is quantity supplied and  $c$  and  $d$  are positive constants.
- a) (3%) Find the equilibrium price and output as functions of constants  $a$ ,  $b$ ,  $c$ , and  $d$ .
- b) (4%) Suppose that a unit tax of  $t$  dollars is imposed on the producers of the commodity. Find the after-tax equilibrium price and output as functions of constants  $a$ ,  $b$ ,  $c$ , and  $d$ .
- c) (4%) Suppose instead, a unit tax of  $t$  dollars is imposed on the buyers of the commodity. Find the after-tax equilibrium price and output as functions of constants  $a$ ,  $b$ ,  $c$ , and  $d$ .
- d) (3%) Are the results in b) and c) the same? Explain.



考試科目	經濟學 B	系別	財政學系 三年級	考試時間	7 月 8 日(五) 第 = 節
------	-------	----	----------	------	---------------------

## I. 單選題 (每題 3 分)

- The current level of real GDP lies below potential GDP. An appropriate fiscal policy would be to \_\_\_\_\_, which will shift the \_\_\_\_\_ curve to the \_\_\_\_\_.  
(A) increase government purchases;  $AD$ ; left. (B). increase transfer payments;  $AS$ ; right. (C). increase tax rates;  $AD$ ; right. (D). increase government purchases;  $AD$ ; right.
- All else equal, if the Federal Reserve decreases the money supply, interest rates will \_\_\_\_\_ and the dollar will \_\_\_\_\_ against other currencies.  
(A) increase; depreciate. (B). decrease; depreciate. (C). decrease; appreciate. (D). increase; appreciate.
- Imagine that someone offers you  $\$X$  today or  $\$1,500$  in 5 years. If the interest rate is 6 percent, then you would prefer to take the  $\$X$  today if and only if  
(A)  $X > 1,055.56$ . (B).  $X > 1,120.89$ . (C).  $X > 1,213.33$ . (D).  $X > 1,338.26$ .
- The sticky-wage theory of the short-run aggregate supply curve says that when the price level rises more than expected,  
(A) production is more profitable and employment rises. (B). production is more profitable and employment falls. (C). production is less profitable and employment rises. (D). production is less profitable and employment falls.
- Given the production function  $Y = AF(K, N)$  and assuming constant returns to scale, the contribution of capital to output growth can be estimated by  
(A) adding the growth rate of capital to the term  $A$ . (B). multiplying the growth rate of capital by capital's share in production. (C). subtracting the growth rate of labor from the rate of technological advancement. (D). multiplying the capital-labor ratio by the level of output.
- The paradox of thrift states that  
(A) an increase in the interest rate lowers saving. (B). an increase in saving raises output in the long run. (C). an increase in saving reduces output in the short run. (D). a decrease in the interest rate raises saving.
- The demand curve for a firm under monopolistic competition is:  
(A) downward sloping, unlike the horizontal demand curve facing a perfectly competitive firm. (B). horizontal, unlike the downward-sloping demand curve facing a perfectly competitive firm. (C). horizontal, the same as that facing a perfectly competitive firm. (D). downward sloping, the same as that facing a perfectly competitive firm.

考試科目	經濟學 B	系別	財政學系 三年級	考試時間	7月8日(五) 第二節
------	-------	----	----------	------	----------------

8. The aggregate demand and aggregate supply model implies monetary neutrality  
(A) only in the long run. (B). only in the short run. (C). in both the short run and the long run. (D). in neither the short run nor long run.
9. The Laffer curve shows that increasing \_\_\_\_\_ increases \_\_\_\_\_ when \_\_\_\_\_ low.  
(A) tax revenue; potential GDP; tax revenue is (B). None of the above answers is correct. (C). potential GDP; tax revenue; tax revenue is (D). tax rates; tax revenue; tax rates are
10. Drug companies can usually obtain patents on new drugs. This turns new ideas into  
(A) private goods, and increase the incentive to engage in research. (B). private goods, but decrease the incentive to engage in research. (C). public goods, and increase the incentive to engage in research. (D). public goods, and decrease the incentive to engage in research.
11. A fair insurance policy is an insurance policy for which the premium:  
(A) is zero. (B). allows the insurance company to profit. (C). equals the expected value of the claims. (D). reflects the needs of the buyer of insurance.
12. National defense and electronics books are similar in that both are \_\_\_\_\_, but they differ in that national defense is \_\_\_\_\_ while electronics books are not.  
(A) rival in consumption; excludable. (B). nonrival in consumption; nonexcludable. (C). excludable; rival in consumption. (D). nonexcludable; nonrival in consumption.
13. An indifference curve shows:  
(A) different combinations of two goods among which the consumer is indifferent. (B). The opportunity cost of one good relative to another. (C). Affordable combinations of goods. (D). Consumption possibilities that a consumer faces at different prices and income.
14. Two firms, Firm A and Firm B, have identical cost curves, yet Firm A operates in perfect competition and Firm B operates in monopolistic competition. In the long run, what can we say about the price and output that each firm charges?  
(A) Firm A's price will be lower than Firm B's price, and A's output will be lower than B's output. (B). Firm A's price will be lower than Firm B's price, and A's output will be greater than B's output. (C). Firm A's price will be greater than Firm B's price, and A's output will be lower than B's output. (D). Firm A's price will be greater than Firm B's price, and A's output will be greater than B's output.

考試科目	經濟學 B	系別	財政學系 三年級	考試時間	7 月 8 日(五) 第 = 節
------	-------	----	----------	------	---------------------

15. If the monopolist's demand curve is  $P = 90 - 3Q$ , then the price at which marginal revenues are zero is A)\$90. B)\$45. C)\$30. D)\$15. E)\$3.

16. Suppose peanut butter is an inferior good and the price of peanut butter rises. We can assume that the:

- (A) substitution effect will cause a decrease in the consumption of peanut butter and the income effect will cause an increase in the consumption of peanut butter. (B). substitution effect will cause an increase in the consumption of peanut butter. (C). income effect will cause an increase in the consumption of peanut butter. (D). substitution effect will cause a decrease in the consumption of peanut butter.

II、分析及演算題

1. Given a utility function:  $U(x, y, z) = \ln(xy) + z$ :

- (a) (6%) Verify if all three commodities exhibit diminishing marginal utility.  
 (b) (10%) Facing price combination of  $(p_x, p_y, p_z)$  and income level of  $I$ , solve for the optimal consumption bundles  $(x^*, y^*, z^*)$ .  
 (c) (12%) 請依據前述計算推導結果，將本表抄寫至答案卷上後，就每個括弧內的多個選項圈選一項正確的財貨屬性，並做簡單說明：

commodity	x	y	z
x	(normal/inferior)(ordinary/Giffen)	(complement/substitute/unrelated)	(complement/substitute/unrelated)
y	(complement/substitute/unrelated)	(normal/inferior)(ordinary/Giffen)	(complement/substitute/unrelated)
z	(complement/substitute/unrelated)	(complement/substitute/unrelated)	(normal/inferior)(ordinary/Giffen)

2. 名詞解釋：(24%)

- (a) automatic stabilizers  
 (b) balance payment on current accounts  
 (c) chained dollar  
 (d) discretionary fiscal policy  
 (e) stagflation  
 (f) deleveraging

備註	試題隨卷繳交
----	--------

考試科目	統計學	系 別	財政學系 三年級	考試時間	7月8日(五)第四節
------	-----	-----	-------------	------	------------

**Question 1 (25 points, 5/5/5/5/5)**

A researcher investigated the impact of national culture ( $X_1$ ), openness of the economy ( $X_2$ ), and financial system ( $X_3$ ) on research & development investment ( $Y$ ). He recorded the data for the OLS multiple regression model as follows :

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

He recorded the data for 6 randomly selected countries and performed an analysis. However, because of a printer malfunction, some of the computer outputs not shown.

ANOVA				
	d.f	SS	MS	F
Regression	--	(b)	250.62	5.01
Residual	(a)	--	(d)	
Total	--	(c)		

	Parameter Estimate	Standard Error	t-Value
constant	117.0701	104.8342	1.116717
$X_1$	(e)	2.100611	-2.288012
$X_2$	3.698848	1.09537	3.376802
$X_3$	1.036396	0.36065	2.873689

- (1) Fill in the missing values of (a) ~ (e).
- (2) Compute the standard error of the estimate and interpret its meaning.
- (3) Compute the value of R Square and interpret its meaning.
- (4) What is the difference between R Square and Adjusted R Square?
- (5) What is "heteroscedasticity"? Explain what will happen if the regression has heteroscedasticity problem under the OLS estimation?

考試科目	統計學	系別	財政學系 三年級	考試時間	7月8日(五)第四節
------	-----	----	----------	------	------------

**Question 2 (25 points, 10/10/5)**

Let  $X_1, X_2, \dots, X_n$  be a random sample of size  $n$  from a normal distribution  $N(\mu, \sigma^2)$ .

Consider the following point estimators of  $\mu$  :

(A)  $\hat{\mu}_1 = \frac{1}{n} \sum_{i=1}^n X_i$                       (B)  $\hat{\mu}_2 = \frac{X_1}{2} + \frac{1}{2(n-1)} \sum_{i=2}^n X_i$

- (1) Which of these is unbiased?
- (2) Which of these is consistent?
- (3) Find the relative efficiencies of  $\hat{\mu}_1$  to  $\hat{\mu}_2$ .

**Question 3 (20 points, 10/5/5)**

The quality control director for a clothing manufacturer wants to study the effect of operators (A, B, C, D) and machines (1, 2, 3) on the breaking strength (in pounds) of wool serge material. The results are as follows :

		operators			
		A	B	C	D
machines	1	5	3	8	4
	2	9	8	13	6
	3	7	4	9	8

If there is no interaction effect, please answer the following questions at the significance level of  $\alpha = 0.05$ :

- (1) Construct the ANOVA Table.
- (2) Test the hypothesis that there is no difference between the means of the operators.
- (3) Test the hypothesis that there is no difference between the means of the machines.

考試科目	統計學	系別	財政學系 三級	考試時間	7月8日(五)第四節
------	-----	----	---------	------	------------

**Question 4 (10 points)**

假設燈泡的壽命服從指數分配，且其平均壽命為 3 小時。若某一系統中有 3 個相互獨立的燈泡，當其中 2 個發生故障時，此系統將會失效。試問此系統至少可使用 6 小時的機率為何？

**Question 5 (20 points)**

假設自一母體隨機抽取 106 個樣本，得到如下的分配結果：

組別	組界	次數
1	小於 135.5	10
2	135.5~139.5	21
3	139.5~143.5	41
4	143.5~147.5	19
5	大於 147.5	15

同時，由上述的資料亦可得出此 106 個樣本之  $\bar{X} = 141.77$  與  $S = 4.41$ 。  
請在  $\alpha = 0.05$  的顯著水準之下，檢定此母體是否為常態分配。

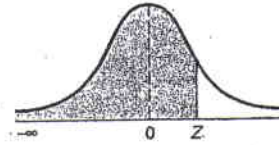
【請注意，背面還有試題。】



考試科目	統計學	系別	財政學系 三年級	考試時間	7月8日(五)第四節
------	-----	----	----------	------	------------

The Cumulative Standardized Normal Distribution (Continued)

Entry represents area under the cumulative standardized normal distribution from  $-\infty$  to Z



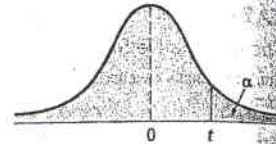
Cumulative Probabilities										
Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7518	0.7549
0.7	0.7580	0.7612	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.99865	0.99869	0.99874	0.99878	0.99882	0.99886	0.99889	0.99893	0.99897	0.99900
3.1	0.99903	0.99906	0.99910	0.99913	0.99916	0.99918	0.99921	0.99924	0.99926	0.99929
3.2	0.99931	0.99934	0.99936	0.99938	0.99940	0.99942	0.99944	0.99946	0.99948	0.99950
3.3	0.99952	0.99953	0.99955	0.99957	0.99958	0.99960	0.99961	0.99962	0.99964	0.99965
3.4	0.99966	0.99968	0.99969	0.99970	0.99971	0.99972	0.99973	0.99974	0.99975	0.99976
3.5	0.99977	0.99978	0.99978	0.99979	0.99980	0.99981	0.99981	0.99982	0.99983	0.99983
3.6	0.99984	0.99985	0.99985	0.99986	0.99986	0.99987	0.99987	0.99988	0.99988	0.99989
3.7	0.99989	0.99990	0.99990	0.99990	0.99991	0.99991	0.99992	0.99992	0.99992	0.99992
3.8	0.99993	0.99993	0.99993	0.99994	0.99994	0.99994	0.99994	0.99995	0.99995	0.99995
3.9	0.99995	0.99995	0.99996	0.99996	0.99996	0.99996	0.99996	0.99996	0.99997	0.99997
4.0	0.999968329									
4.5	0.999996602									
5.0	0.999999713									
5.5	0.999999981									
6.0	0.999999999									

備註 試題隨卷繳交

考試科目	統計學	系別	財政學系 三年級	考試時間	7月8日(五)第四節
------	-----	----	----------	------	------------

Critical Values of t

For a particular number of degrees of freedom, entry represents the critical value of t corresponding to a specified upper-tail area ( $\alpha$ ).



Degrees of Freedom	Cumulative Probabilities					
	0.75	0.90	0.95	0.975	0.99	0.995
	Upper-Tail Areas					
	0.25	0.10	0.05	0.025	0.01	0.005
1	1.0000	3.0777	6.3138	12.7062	31.8207	63.6574
2	0.8165	1.8856	2.9200	4.3027	6.9646	9.9248
3	0.7649	1.6377	2.3534	3.1824	4.5407	5.8409
4	0.7407	1.5332	2.1318	2.7764	3.7469	4.6041
5	0.7267	1.4759	2.0150	2.5706	3.3649	4.0322
6	0.7176	1.4398	1.9432	2.4469	3.1427	3.7074
7	0.7111	1.4149	1.8946	2.3646	2.9980	3.4995
8	0.7064	1.3968	1.8595	2.3060	2.8965	3.3554
9	0.7027	1.3830	1.8331	2.2622	2.8214	3.2498
10	0.6998	1.3722	1.8125	2.2281	2.7638	3.1693
11	0.6974	1.3634	1.7959	2.2010	2.7181	3.1058
12	0.6955	1.3562	1.7823	2.1788	2.6810	3.0545
13	0.6938	1.3502	1.7709	2.1604	2.6503	3.0123
14	0.6924	1.3450	1.7613	2.1448	2.6245	2.9768
15	0.6912	1.3406	1.7531	2.1315	2.6025	2.9467
16	0.6901	1.3368	1.7459	2.1199	2.5835	2.9208
17	0.6892	1.3334	1.7396	2.1098	2.5669	2.8982
18	0.6884	1.3304	1.7341	2.1009	2.5524	2.8784
19	0.6876	1.3277	1.7291	2.0930	2.5395	2.8609
20	0.6870	1.3253	1.7247	2.0860	2.5280	2.8453
21	0.6864	1.3232	1.7207	2.0796	2.5177	2.8314
22	0.6858	1.3212	1.7171	2.0739	2.5083	2.8188
23	0.6853	1.3195	1.7139	2.0687	2.4999	2.8073
24	0.6848	1.3178	1.7109	2.0639	2.4922	2.7969
25	0.6844	1.3163	1.7081	2.0595	2.4851	2.7874
26	0.6840	1.3150	1.7056	2.0555	2.4786	2.7787
27	0.6837	1.3137	1.7033	2.0518	2.4727	2.7707
28	0.6834	1.3125	1.7011	2.0484	2.4671	2.7633
29	0.6830	1.3114	1.6991	2.0452	2.4620	2.7564
30	0.6828	1.3104	1.6973	2.0423	2.4573	2.7500
31	0.6825	1.3095	1.6955	2.0395	2.4528	2.7440
32	0.6822	1.3086	1.6939	2.0369	2.4487	2.7385
33	0.6820	1.3077	1.6924	2.0345	2.4448	2.7333
34	0.6818	1.3070	1.6909	2.0322	2.4411	2.7284
35	0.6816	1.3062	1.6896	2.0301	2.4377	2.7238
36	0.6814	1.3055	1.6883	2.0281	2.4345	2.7195
37	0.6812	1.3049	1.6871	2.0262	2.4314	2.7154
38	0.6810	1.3042	1.6860	2.0244	2.4286	2.7116
39	0.6808	1.3036	1.6849	2.0227	2.4258	2.7079
40	0.6807	1.3031	1.6839	2.0211	2.4233	2.7045
41	0.6805	1.3025	1.6829	2.0195	2.4208	2.7012
42	0.6804	1.3020	1.6820	2.0181	2.4185	2.6981
43	0.6802	1.3016	1.6811	2.0167	2.4163	2.6951
44	0.6801	1.3011	1.6802	2.0154	2.4141	2.6923
45	0.6800	1.3006	1.6794	2.0141	2.4121	2.6896
46	0.6799	1.3002	1.6787	2.0129	2.4102	2.6870
47	0.6797	1.2998	1.6779	2.0117	2.4083	2.6846
48	0.6796	1.2994	1.6772	2.0106	2.4066	2.6822

continued

備註 試題隨卷繳交

【請注意，背面還有試題。】

考試科目	統計學	系別	財政學系 三年級	考試時間	7月8日(五)第四節
------	-----	----	----------	------	------------

Critical Values of t  
(Continued)

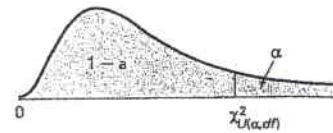
Degrees of Freedom	Cumulative Probabilities					
	0.75	0.90	0.95	0.975	0.99	0.995
	Upper-Tail Areas					
	0.25	0.10	0.05	0.025	0.01	0.005
49	0.6795	1.2991	1.6766	2.0096	2.4049	2.6800
50	0.6794	1.2987	1.6759	2.0086	2.4033	2.6778
51	0.6793	1.2984	1.6753	2.0076	2.4017	2.6757
52	0.6792	1.2980	1.6747	2.0066	2.4002	2.6737
53	0.6791	1.2977	1.6741	2.0057	2.3988	2.6718
54	0.6791	1.2974	1.6736	2.0049	2.3974	2.6700
55	0.6790	1.2971	1.6730	2.0040	2.3961	2.6682
56	0.6789	1.2969	1.6725	2.0032	2.3948	2.6665
57	0.6788	1.2966	1.6720	2.0025	2.3936	2.6649
58	0.6787	1.2963	1.6716	2.0017	2.3924	2.6633
59	0.6787	1.2961	1.6711	2.0010	2.3912	2.6618
60	0.6786	1.2958	1.6706	2.0003	2.3901	2.6603
61	0.6785	1.2956	1.6702	1.9996	2.3890	2.6589
62	0.6785	1.2954	1.6698	1.9990	2.3880	2.6575
63	0.6784	1.2951	1.6694	1.9983	2.3870	2.6561
64	0.6783	1.2949	1.6690	1.9977	2.3860	2.6549
65	0.6783	1.2947	1.6686	1.9971	2.3851	2.6536
66	0.6782	1.2945	1.6683	1.9966	2.3842	2.6524
67	0.6782	1.2943	1.6679	1.9960	2.3833	2.6512
68	0.6781	1.2941	1.6676	1.9955	2.3824	2.6501
69	0.6781	1.2939	1.6672	1.9949	2.3816	2.6490
70	0.6780	1.2938	1.6669	1.9944	2.3808	2.6479
71	0.6780	1.2936	1.6666	1.9939	2.3800	2.6469
72	0.6779	1.2934	1.6663	1.9935	2.3793	2.6459
73	0.6779	1.2933	1.6660	1.9930	2.3785	2.6449
74	0.6778	1.2931	1.6657	1.9925	2.3778	2.6439
75	0.6778	1.2929	1.6654	1.9921	2.3771	2.6430
76	0.6777	1.2928	1.6652	1.9917	2.3764	2.6421
77	0.6777	1.2926	1.6649	1.9913	2.3758	2.6412
78	0.6776	1.2925	1.6646	1.9908	2.3751	2.6403
79	0.6776	1.2924	1.6644	1.9905	2.3745	2.6395
80	0.6776	1.2922	1.6641	1.9901	2.3739	2.6387
81	0.6775	1.2921	1.6639	1.9897	2.3733	2.6379
82	0.6775	1.2920	1.6636	1.9893	2.3727	2.6371
83	0.6775	1.2918	1.6634	1.9890	2.3721	2.6364
84	0.6774	1.2917	1.6632	1.9886	2.3716	2.6356
85	0.6774	1.2916	1.6630	1.9883	2.3710	2.6349
86	0.6774	1.2915	1.6628	1.9879	2.3705	2.6342
87	0.6773	1.2914	1.6626	1.9876	2.3700	2.6335
88	0.6773	1.2912	1.6624	1.9873	2.3695	2.6329
89	0.6773	1.2911	1.6622	1.9870	2.3690	2.6322
90	0.6772	1.2910	1.6620	1.9867	2.3685	2.6316
91	0.6772	1.2909	1.6618	1.9864	2.3680	2.6309
92	0.6772	1.2908	1.6616	1.9861	2.3676	2.6303
93	0.6771	1.2907	1.6614	1.9858	2.3671	2.6297
94	0.6771	1.2906	1.6612	1.9855	2.3667	2.6291
95	0.6771	1.2905	1.6611	1.9853	2.3662	2.6286
96	0.6771	1.2904	1.6609	1.9850	2.3658	2.6280
97	0.6770	1.2903	1.6607	1.9847	2.3654	2.6275
98	0.6770	1.2902	1.6606	1.9845	2.3650	2.6269
99	0.6770	1.2902	1.6604	1.9842	2.3646	2.6264
100	0.6770	1.2901	1.6602	1.9840	2.3642	2.6259
110	0.6767	1.2893	1.6588	1.9818	2.3607	2.6213
120	0.6765	1.2886	1.6577	1.9799	2.3578	2.6174
∞	0.6745	1.2816	1.6449	1.9600	2.3263	2.5758

備註 試題隨卷繳交

考試科目	統計學	系 別	財政學系 三年級	考試時間	7 月 8 日(五)第四節
------	-----	-----	----------	------	---------------

**Critical Values of  $\chi^2$**

For a particular number of degrees of freedom, entry represents the critical value of  $\chi^2$  corresponding to a specified upper-tail area ( $\alpha$ ).



Degrees of Freedom	Cumulative Probabilities											
	0.005	0.01	0.025	0.05	0.10	0.25	0.75	0.90	0.95	0.975	0.99	0.995
	Upper Tail Areas ( $\alpha$ )											
	0.995	0.99	0.975	0.95	0.90	0.75	0.25	0.10	0.05	0.025	0.01	0.005
1			0.001	0.004	0.016	0.102	1.323	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	0.575	2.773	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	1.213	4.108	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	1.923	5.385	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	2.675	6.626	9.236	11.071	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	3.455	7.841	10.645	12.592	14.449	16.812	18.458
7	0.989	1.239	1.690	2.167	2.833	4.255	9.037	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	5.071	10.219	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	5.899	11.389	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	6.737	12.549	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	7.584	13.701	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	8.438	14.845	18.549	21.026	23.337	26.217	28.299
13	3.565	4.107	5.009	5.892	7.042	9.299	15.984	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	10.165	17.117	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	11.037	18.245	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	11.912	19.369	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	12.792	20.489	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	13.675	21.605	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	14.562	22.718	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	15.452	23.828	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	16.344	24.935	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.042	17.240	26.039	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	18.137	27.141	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	19.037	28.241	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	19.939	29.339	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	20.843	30.435	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	21.749	31.528	36.741	40.113	43.194	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	22.657	32.620	37.916	41.337	44.461	48.278	50.993
29	13.121	14.257	16.047	17.708	19.768	23.567	33.711	39.087	42.557	45.722	49.588	52.336
30	13.787	14.954	16.791	18.493	20.599	24.478	34.800	40.256	43.773	46.979	50.892	53.672

For larger values of degrees of freedom ( $df$ ) the expression  $Z = \sqrt{2\chi^2} - \sqrt{2(df) - 1}$  may be used and the resulting upper-tail area can be found from the cumulative standardized normal distribution (Table E.2).

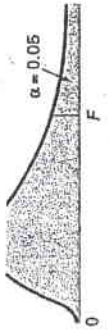
備 註 試 題 隨 卷 繳 交

【請注意，背面還有試題。】

考試科目 統計學

系 別 財政學系 三 年 級

考試時間 7 月 8 日(五)第四節



Critical Values of F  
 For a particular combination of numerator and denominator degrees of freedom, entry represents the critical values of F corresponding to the cumulative probability  $(1 - \alpha)$  and a specified upper-tail area ( $\alpha$ ).

Cumulative Probability = 0.95  
 Upper-Tail Area = 0.05

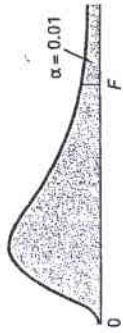
Denominator, $df_2$	Numerator, $df_1$																		
	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	$\infty$
1	161.40	199.50	215.70	224.60	230.20	234.00	236.80	238.90	240.50	241.90	243.90	245.90	248.00	249.10	250.10	251.10	252.20	253.30	254.30
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.91	1.89	1.84	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
$\infty$	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

continued

考試科目 統計學

系別 財政學系 三年級

考試時間 7月8日(五)第四節



Critical Values of F (Continued)

Cumulative Probabilities = 0.99  
Upper-Tail Areas = 0.01

Denominator, $df_2$	Numerator, $df_1$																			
	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	$\infty$	
1	4.052	4.999	5.403	5.625	5.764	5.859	5.928	5.982	6.022	6.056	6.106	6.157	6.209	6.235	6.261	6.287	6.313	6.339	6.366	
2	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39	99.40	99.42	99.43	99.44	99.46	99.47	99.47	99.48	99.49	99.50	
3	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35	27.23	27.05	26.87	26.69	26.60	26.50	26.41	26.32	26.22	26.13	
4	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.37	14.20	14.02	13.93	13.84	13.75	13.65	13.56	13.46	
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.89	9.72	9.55	9.47	9.38	9.29	9.20	9.11	9.02	
6	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.72	7.56	7.40	7.31	7.23	7.14	7.06	6.97	6.88	
7	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.47	6.31	6.16	6.07	5.99	5.91	5.82	5.74	5.65	
8	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.67	5.52	5.36	5.28	5.20	5.12	5.03	4.95	4.86	
9	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.11	4.96	4.81	4.73	4.65	4.57	4.48	4.40	4.31	
10	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.71	4.56	4.41	4.33	4.25	4.17	4.08	4.00	3.91	
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.40	4.25	4.10	4.02	3.94	3.86	3.78	3.69	3.60	
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.16	4.01	3.86	3.78	3.70	3.62	3.54	3.45	3.36	
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	3.96	3.82	3.66	3.59	3.51	3.43	3.34	3.25	3.17	
14	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.80	3.66	3.51	3.43	3.35	3.27	3.18	3.09	3.00	
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.67	3.52	3.37	3.29	3.21	3.13	3.05	2.96	2.87	
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.55	3.41	3.26	3.18	3.10	3.02	2.95	2.81	2.75	
17	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.46	3.31	3.16	3.08	3.00	2.92	2.83	2.75	2.65	
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.37	3.23	3.08	3.00	2.92	2.84	2.75	2.66	2.57	
19	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.30	3.15	3.00	2.92	2.84	2.76	2.67	2.58	2.49	
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.23	3.09	2.94	2.86	2.78	2.69	2.61	2.52	2.42	
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.17	3.03	2.88	2.80	2.72	2.64	2.55	2.46	2.36	
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.12	2.98	2.83	2.75	2.67	2.58	2.50	2.40	2.31	
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	3.07	2.93	2.78	2.70	2.62	2.54	2.45	2.35	2.26	
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.03	2.89	2.74	2.66	2.58	2.49	2.40	2.31	2.21	
25	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	2.99	2.85	2.70	2.62	2.54	2.45	2.36	2.27	2.17	
26	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18	3.09	2.96	2.81	2.66	2.58	2.50	2.42	2.33	2.23	2.13	
27	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15	3.06	2.93	2.78	2.63	2.55	2.47	2.38	2.29	2.20	2.10	
28	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12	3.03	2.90	2.75	2.60	2.52	2.44	2.35	2.26	2.17	2.06	
29	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09	3.00	2.87	2.73	2.57	2.49	2.41	2.33	2.23	2.14	2.03	
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.84	2.70	2.55	2.47	2.39	2.30	2.21	2.11	2.01	
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.66	2.52	2.37	2.29	2.20	2.11	2.02	1.92	1.80	
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.50	2.35	2.20	2.12	2.03	1.94	1.84	1.73	1.60	
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.34	2.19	2.03	1.95	1.86	1.76	1.66	1.53	1.38	
$\infty$	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.18	2.04	1.88	1.79	1.70	1.59	1.47	1.32	1.00	

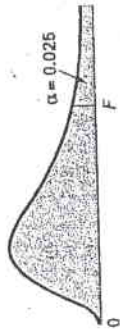
continued

【請注意, 背面還有試題。】

考試科目 統計學

系別 財政學系 三年級

考試時間 7月8日(五)第四節



Critical Values of F (Continued)

Cumulative Probabilities = 0.975

Upper Tail Areas = 0.025

Numerator,  $df_1$

$df_2$	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	$\infty$
1	647.80	799.50	864.20	899.60	921.80	937.40	948.20	956.70	963.30	968.60	976.70	984.90	993.10	997.20	1,001.00	1,006.00	1,010.00	1,014.00	1,018.00
2	38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.39	39.40	39.41	39.43	39.45	39.46	39.46	39.46	39.47	39.48	39.49	39.50
3	17.44	16.04	15.44	15.10	14.88	14.73	14.62	14.54	14.47	14.42	14.34	14.25	14.17	14.12	14.08	14.04	13.99	13.95	13.90
4	12.22	10.65	9.98	9.60	9.36	9.20	9.07	8.98	8.90	8.84	8.75	8.66	8.56	8.51	8.46	8.41	8.36	8.31	8.26
5	10.01	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68	6.62	6.54	6.43	6.33	6.28	6.23	6.18	6.12	6.07	6.02
6	8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52	5.46	5.37	5.27	5.17	5.12	5.07	5.01	4.96	4.90	4.85
7	8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82	4.76	4.67	4.57	4.47	4.42	4.36	4.31	4.25	4.20	4.14
8	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36	4.30	4.20	4.10	4.00	3.95	3.89	3.84	3.78	3.73	3.67
9	7.21	5.71	5.08	4.72	4.48	4.32	4.20	4.10	4.03	3.96	3.87	3.77	3.67	3.61	3.56	3.51	3.45	3.39	3.33
10	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78	3.72	3.62	3.52	3.42	3.37	3.31	3.26	3.20	3.14	3.08
11	6.72	5.26	4.63	4.28	4.04	3.88	3.76	3.66	3.59	3.53	3.43	3.33	3.23	3.17	3.12	3.06	3.00	2.94	2.88
12	6.55	5.10	4.47	4.12	3.89	3.73	3.61	3.51	3.44	3.37	3.28	3.18	3.07	3.02	2.96	2.91	2.85	2.79	2.72
13	6.41	4.97	4.35	4.00	3.77	3.60	3.48	3.39	3.31	3.25	3.15	3.05	2.95	2.89	2.84	2.78	2.72	2.66	2.60
14	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.21	3.15	3.05	2.95	2.84	2.79	2.73	2.67	2.61	2.55	2.49
15	6.20	4.77	4.15	3.80	3.58	3.41	3.29	3.20	3.12	3.06	2.96	2.86	2.76	2.70	2.64	2.59	2.52	2.46	2.40
16	6.12	4.69	4.08	3.73	3.50	3.34	3.22	3.12	3.05	2.99	2.89	2.79	2.68	2.62	2.57	2.51	2.45	2.38	2.32
17	6.04	4.62	4.01	3.66	3.44	3.28	3.16	3.06	2.98	2.92	2.82	2.72	2.62	2.56	2.50	2.44	2.38	2.32	2.25
18	5.98	4.56	3.95	3.61	3.38	3.22	3.10	3.01	2.93	2.87	2.77	2.67	2.56	2.50	2.44	2.38	2.32	2.26	2.19
19	5.92	4.51	3.90	3.56	3.33	3.17	3.05	2.96	2.88	2.82	2.72	2.62	2.51	2.45	2.39	2.33	2.27	2.20	2.13
20	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.84	2.77	2.68	2.57	2.46	2.41	2.35	2.29	2.22	2.16	2.09
21	5.83	4.42	3.82	3.48	3.25	3.09	2.97	2.87	2.80	2.73	2.64	2.53	2.42	2.37	2.31	2.25	2.18	2.11	2.04
22	5.79	4.38	3.78	3.44	3.22	3.05	2.93	2.84	2.76	2.70	2.60	2.50	2.39	2.33	2.27	2.21	2.14	2.08	2.00
23	5.75	4.35	3.75	3.41	3.18	3.02	2.90	2.81	2.73	2.67	2.57	2.47	2.36	2.30	2.24	2.18	2.11	2.04	1.97
24	5.72	4.32	3.72	3.38	3.15	2.99	2.87	2.78	2.70	2.64	2.54	2.44	2.33	2.27	2.21	2.15	2.08	2.01	1.94
25	5.69	4.29	3.69	3.35	3.13	2.97	2.85	2.75	2.68	2.61	2.51	2.41	2.30	2.24	2.18	2.12	2.05	1.98	1.91
26	5.66	4.27	3.67	3.33	3.10	2.94	2.82	2.73	2.65	2.59	2.49	2.39	2.28	2.22	2.16	2.09	2.03	1.95	1.88
27	5.63	4.24	3.65	3.31	3.08	2.92	2.80	2.71	2.63	2.57	2.47	2.37	2.25	2.19	2.13	2.07	2.00	1.93	1.85
28	5.61	4.22	3.63	3.29	3.06	2.90	2.78	2.69	2.61	2.55	2.45	2.34	2.23	2.17	2.11	2.05	1.98	1.91	1.83
29	5.59	4.20	3.61	3.27	3.04	2.88	2.76	2.67	2.59	2.53	2.43	2.32	2.21	2.15	2.09	2.03	1.96	1.89	1.81
30	5.57	4.18	3.59	3.25	3.03	2.87	2.75	2.65	2.57	2.51	2.41	2.31	2.20	2.14	2.07	2.01	1.94	1.87	1.79
40	5.42	4.05	3.46	3.13	2.90	2.74	2.62	2.53	2.45	2.39	2.29	2.18	2.07	2.01	1.94	1.88	1.80	1.72	1.64
60	5.29	3.93	3.34	3.01	2.79	2.63	2.51	2.41	2.33	2.27	2.17	2.06	1.94	1.88	1.82	1.74	1.67	1.58	1.48
120	5.15	3.80	3.23	2.89	2.67	2.52	2.39	2.30	2.22	2.16	2.05	1.94	1.82	1.76	1.69	1.61	1.53	1.43	1.31
$\infty$	5.02	3.69	3.12	2.79	2.57	2.41	2.29	2.19	2.11	2.05	1.94	1.83	1.71	1.64	1.57	1.48	1.39	1.27	1.00

continued

備

註

試題隨卷繳交