



國立雲林科技大學 103 學年度
碩士班招生考試試題

系所：財金系
科目：統計學(3)

Notes: The point weights for each question are assigned. A couple of probability density tables are provided for finding the value of probability.

- (5 points) If e^{3t+8t^2} is the moment-generating function of the random variable X , find $\Pr(-1 < X < 9)$.
- (10 points) If X is $N(\mu, \sigma^2)$, show that $E(|X - \mu|) = \sigma \sqrt{\frac{2}{\pi}}$
- (5 points) If X is $N(75, 25)$, find the conditional probability that X is greater than 80 relative to the hypothesis that X is greater than 77.
- (10 points) Let X_1, X_2, X_3 be a random sample from a distribution of the continuous type having p.d.f. $f(x) = 2x$, $0 < x < 1$, zero elsewhere. Compute the probability that the smallest of these X_i exceeds the median of the distribution.
- (10 points) Let Y_1, Y_2, Y_3 be a random sample from a normal distribution where both μ and σ^2 are unknown. Which is a more efficient estimator for μ ,

$$\hat{\mu}_1 = \frac{1}{4}Y_1 + \frac{1}{2}Y_2 + \frac{1}{4}Y_3 \quad \text{or} \quad \hat{\mu}_2 = \frac{1}{3}Y_1 + \frac{1}{2}Y_2 + \frac{1}{6}Y_3$$
- At 6:00 am, you are hitching on a highway arriving Westland. Suppose that during the early morning, the number of car going West can be thought to follow, approximately, a Poisson distribution at a rate of cars per hour. The first car doesn't stop.
 - (5 points) What is the probability that you have to wait at least another 30 minutes before the next car comes?
 - (5 points) Suppose you believe there is a 80% chance that any given car gives you ride, how long do you expect to wait?
- (5 points) An investigator is exploring the market values (in thousands) of biology technology companies listed on NYSE and NASDAQ.

	NYSE	NASDAQ
Sample Mean	86900	84000
Sample Standard Deviation	2300	1750
Sample Size	9	7

Assume equal population variances. Please evaluate the risk of investment in biology technology companies by calculating pooled estimate of variance.



8. (5 points) One research is to evaluate whether the U.S. financial institutions can survive from the stress test. The test was conducted from 7 regions of approximately equal number of banks, securities companies and insurance firms. After the test, 315 financial institutions survived. The number of financial institutions which survived from stress test in each of the 7 regions are given below. (Note: $\chi^2_{0.01}(6) = 16.81$)

Region	1	2	3	4	5	6	7
Survive	45	60	30	40	50	55	35

The authority wants to know if there is equal credit rating performance across all regions. Using significance level of 0.01, please examine whether the probabilities of survival are equal for all 7 regions.

9. The YunTech Investment is investigating a study on the differences in operating performance of listed companies. An industry researcher is responsible for exploring what factors could account for the differences. The regressors include Sales, R&D, and Firm Size. The random sample of listed companies is collected and the following regression results are provided. (Note: $F_{0.01}(3,32) = 4.51$; $t_{0.025}(32) = 2.036$)

Regressor	Estimated Coefficient	Estimated Standard Deviation
Constant	35.178	7.595
Sales	0.22073	0.07131
R&D	0.3353	0.1901
Firm size	0.093	0.1675

Analysis of Variance

Source	DF	Sum of Squared
Regression	3	1053.09
Residual Error	32	1858.5

- (1) (10 points) Please calculate the total sum of squares, the explained variation, coefficient of determination, and the adjusted R^2 . What would you suggest by the calculated values?
- (2) (10 points) Please test the overall goodness-of-fit with significance level of 0.01. What is your modelling decision?
- (3) (5 points) Using significance level of 0.05, please examine whether the Sales is helpful for improving corporate performance.
- (4) (5 points) Please show the 90% confidence interval for the coefficient of R&D. How to interpret the meaning of the calculated intervals?
- (5) (10 points) Please show the regression equation and calculate the predicted value of corporate performance and residual if the actual values of determinants are: Sales = 50, R&D = 43, and Firm Size = 48.3. How to interpret the predicted value and residual value?



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Table 1 The Standard Normal Distribution

$$N(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} e^{-\frac{w^2}{2}} dw$$

z	N(z)	z	N(z)	z	N(z)
0.00	0.500	1.10	0.864	2.05	0.980
0.05	0.520	1.15	0.875	2.10	0.982
0.10	0.540	1.20	0.885	2.15	0.984
0.15	0.560	1.25	0.894	2.20	0.986
0.20	0.579	1.282	0.900	2.25	0.988
0.25	0.599	1.30	0.903	2.30	0.989
0.30	0.618	1.35	0.911	2.326	0.990
0.35	0.637	1.40	0.919	2.35	0.991
0.40	0.655	1.45	0.926	2.40	0.992
0.45	0.674	1.50	0.933	2.45	0.993
0.50	0.691	1.55	0.939	2.50	0.994
0.55	0.709	1.60	0.945	2.55	0.995
0.60	0.726	1.645	0.950	2.576	0.995
0.65	0.742	1.65	0.951	2.60	0.995
0.70	0.758	1.70	0.955	2.65	0.996
0.75	0.773	1.75	0.960	2.70	0.997
0.80	0.788	1.80	0.964	2.75	0.997
0.85	0.802	1.85	0.968	2.80	0.997
0.90	0.816	1.90	0.971	2.85	0.998
0.95	0.829	1.95	0.974	2.90	0.998
1.00	0.841	1.96	0.975	2.95	0.998
1.05	0.853	2.00	0.977	3.00	0.999



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請於答案卷上依序標明題號作答: 1-5 題為填充題, 每題 3 分; 6-16 題為選擇題, 每題 3 分; 17-29 題為計算題, 每題 4 分; 合計 100 分。

1. The following three firms are all in the same industries. Based on price-earnings ratio, which firm's stock is the most valuable?

	Firm A	Firm B	Firm C
Net Income	\$32 million	\$6 million	\$14 million
Market Capitalization	\$320 million	\$72 million	\$154 million
Earnings per share	\$4	\$3	\$7

2. The longer time to maturity and the lower coupon rate of a bond, the _____ interest rate risk the bond has.
3. A bond with semi-annual interest payments, all else equal, would be priced _____ (higher or lower) than one with annual interest payments.
4. A MLB second baseman is considering the following offers from two teams. Both proposals are 5-year contract which provide a total income of \$200 million. Team A will pay five annual payments starting with \$80 million the first year followed by four annual payments of \$30 million each. Team B will pay five annual payments of \$40 million each year. What would you recommend the MLB star to choose?
5. What is the decision rule might best be used as a supplement to net present value (NPV) by a firm that favors LIQUIDITY?
6. The internal rate of return (IRR):
- more reliable as a decision making tool than net present value whenever you are considering mutually exclusive projects.
 - is the rate generated solely by the cash flows of an investment.
 - is the rate that causes the net present value of a project to exactly equal zero.
 - The internal rate of return (IRR) can provide information on how sensitive your analysis is to errors in the estimate of your cost of capital.
- (A) I and IV only
(B) II and III only
(C) I, II, and IV only
(D) II, III, IV only
(E) I, II, III, and IV.



7. Which of the following statements are FALSE?
- I. The Capital Market Line is the pricing relationship between the optimal portfolio and the standard deviation of portfolio return.
 - II. The efficient set of portfolios is the lowest overall risk portfolio.
 - III. A stock with an actual return that lies above the security market line has yielded a higher return than expected for the level of risk assumed.
 - IV. The primary purpose of portfolio diversification is to eliminate systematic risk.
- (A) I and II only
(B) II and III only
(C) II and IV only
(D) I, II, III only
(E) II, III, IV only.
8. The total rate of return earned on a stock is composed of which of the followings?
- I. current yield
 - II. yield to maturity
 - III. dividend yield
 - IV. capital gains yield
- (A) I and II only
(B) I and IV only
(C) II and IV only
(D) III and IV only.
9. Which of the following statements is FALSE?
- (A) A firm can increase its dividend by decreasing its shares outstanding
 - (B) If a firm wants to increase its share price, it must cut its dividend and invest more.
 - (C) A firm can increase its growth rate by retaining more of its earnings.
 - (D) You should be willing to pay proportionally less for a stock with lower current earnings.
10. In which way an exporter CAN reduce its foreign exchange risk?
- I. To purchase its inputs from the same foreign market it sells its goods.
 - II. To long a call option on the foreign currency it will receive.
 - III. To take a long position in forward contract.
 - IV. To borrow money in the foreign currency it will receive.
- (A) I and II only
(B) I and III only
(C) I, II and III only
(D) I and IV only.



11. If an IPO is underpriced then the:
- I. investors in the IPO are generally unhappy with the underwriters.
 - II. issue is less likely to sell out.
 - III. stock price will generally decline on the first day of trading.
 - IV. issuing firm receives less money than it probably should have.
 - V. issuing firm is guaranteed to be successful in the long term.
- (A) I, II and IV
(B) II, III and V
(C) IV and V
(D) II and IV
(E) all statements are correct.
12. Michael has invested in twelve different stocks that have a combined value today of \$121,300. Twelve percent of that total is invested in Claire Cosmetic Enterprise. Which of the following statements are correct based on portfolio theory?
- I. The 12 percent is a measure of portfolio return
 - II. The 12 percent is a measure of portfolio weight
 - III. The 12 percent is a measure of index value
 - IV. invest on 12 different stocks is aimed to increase return
 - V. invest on 12 different stocks is aimed to reduce risk
- (A) I and IV
(B) II and IV
(C) I and V
(D) II and V
(E) III and V.
13. Danielle's is a furniture store that is considering adding appliances to its offerings. Which of the following should be considered incremental cash flows of this project?
- I. utilizing the credit offered by a supplier to purchase the appliance inventory
 - II. benefiting from increased furniture sales to appliance customers.
 - III. borrowing money from a bank to fund the appliance project
 - IV. purchasing parts for inventory to handle any appliance repairs that might be necessary
- (A) I and II only
(B) III and IV only
(C) I, II, and IV only
(D) II, III, and IV only
(E) I, II, III, and IV.



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14. Market interest rates have risen substantially in the five years since an investor purchased Treasury bonds that were offering a 5% return. Which of the following statements are correct if the investor sells the bond now?
- I. the investor's return is irrelevant to the change of interest rate
 - II. the investor's return is relevant to the change of interest rate
 - III. she is likely to receive greater than a 5% total return.
 - IV. she is likely to receive less than a 5% total return.
 - V. she is likely to receive a 5% total rate of return.
 - VI. she is likely to receive a 5% nominal return but less than a 7% real return.
- (A) II and III
(B) II and IV
(C) II and VI
(D) I and V
(E) I and VI.
15. Which combination of positions will tend to protect the owner from downside risk?
- I. Buy the stock
 - II. Sell the stock
 - III. Buy a call option
 - IV. Buy a put option
 - V. Sell a put option
- (A) I and IV only
(B) II and III only
(C) I and V only
(D) I and III only
(E) No correct answer in above.
16. MM's proposition concerning dividends contends that shareholders will:
- (A) offer higher prices for higher dividend payouts.
 - (B) not offer higher prices for higher dividend payouts.
 - (C) offer higher prices for lower dividend payouts.
 - (D) only purchase stocks that have high dividend payouts.
 - (E) No correct answer above.
17. Assume that shares in Johnson limited have a beta coefficient of 1.5. The market risk premium is 8% and the risk-free rate is 5%. What is Johnson limited's cost of equity capital?



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18. Kelso's has a debt-equity ratio of 0.55 and a tax rate of 35 percent. The firm does not issue preferred stock. The cost of equity is 14.5 percent and the aftertax cost of debt is 4.8 percent. What is the weighted average cost of capital?
19. What is the amount of the annual interest tax shield for a firm with \$3 million in debt that pays 12% interest if the firm is in the 40% tax bracket?
20. How much must the stock be worth at expiration in order for a call holder to break even if the exercise price is \$65 and the call premium was \$5?
21. If the annual percentage rate is 20%, what is the effective annual rate which compounded semi-annually?
22. You just win a lottery prize. The total amount you obtain after tax is \$120 million. To prevent from squandering this easy wealth, you plan to put \$120 million on trust. You expect that the \$120 million wealth will provide perpetuity starting from the end of this year and the amount should grow at 2% per year to maintain purchasing power. Given an interest rate of 12%, what will you receive at the end of this year?
23. The market has an expected rate of return of 12.8%. The long-term government bond is expected to yield 4.5% and the Treasury bill is expected to yield 3.5%. The inflation rate is 3.1%. What is the market risk premium?
24. The stock of PC Industries has a beta of 1.2. The risk-free rate of return is 3% and the market risk premium is 5%. What is the expected rate of return on PC Industries stock?
25. What is the expected return on a portfolio that is equally weighted between stocks X and Y given the following information?

State of economy	Probability of state of economy	Return of stock X	Return of stock Y
Boom	25%	16%	13%
Normal	75%	12%	8%

26. Which of the following statements is true for a stock that sells now for \$60, pays an annual dividend of \$4.00, and experienced a 20% return on investment over the past year? Its price one year ago was?



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27. What is the proportion of debt financing for a firm that expects a 24% return on equity, a 16% return on assets, and a 12% return on debt? Ignore taxes.
28. The Corner Bakery has a debt-equity ratio of 0.54. The firm's required return on assets is 14.2 percent and its cost of equity is 16.1 percent. What is the pre-tax cost of debt based on M&M Proposition II with no taxes?
29. Tony Corp. has 1,000 shares outstanding and retained earnings of \$25,000. Theoretically, what would you expect to happen to the price of their stock, currently selling for \$40 per share, if a 25% stock dividend is declared?



本試題共 11 題，共計 100 分。

1. (12 points) Jane receives utility from days spent traveling on vacation domestically (D) and days spent traveling on vacation in a foreign country (F), as given by the utility function $U(D,F)=10DF$. In addition, the price of a day spent traveling domestically is \$100, the price of a day spent traveling in a foreign country is \$400, and Jane's annual travel budget is \$4000.
 - a. Illustrate the indifference curve associated with a utility of 800 and the indifference curve associated with a utility of 1200.
 - b. Graph Jane's budget line on the same graph.
 - c. Can Jane afford any of the bundles that give her a utility of 800? What about a utility of 1200?
 - d. Find Jane's utility-maximizing choice of days spent traveling domestically and days spent in a foreign country.

2. (8 points) Do the following functions exhibit increasing, constant, or decreasing returns to scale?
 - a. $Q=3L+2K$
 - b. $Q=(2L+2K)^{1/2}$
 - c. $Q=3LK^2$
 - d. $Q=L^{1/2}K^{1/2}$
 - e. $Q=4L^{1/2}+4K$

3. (10 points) Suppose that a firm's production function is $q=10L^{1/2}K^{1/2}$. The cost of a unit of labor is \$20 and the cost of a unit of capital is \$80.
 - a. The firm is currently producing 100 units of output and has determined that the cost-minimizing quantities of labor and capital are 20 and 5, respectively. Graphically illustrate this using isoquants and isocost lines.
 - b. The firm now wants to increase output to 140 units. If capital is fixed in the short run, how much labor will the firm require? Illustrate this graphically and find the firm's new total cost.
 - c. If the marginal rate of technical substitution is K/L , find the optimal level of capital and labor required to produce the 140 units of output.

4. (10 points) A sales tax of \$1 per unit of output is placed on a particular firm whose product sells for \$5 in a competitive industry with many firms.
 - a. How will this tax affect the cost curves for the firm?
 - b. What will happen to the firm's price, output, and profit?



- c. Will there be entry or exit in the industry?
5. (10 points) A monopolist faces the following demand curve:
- $$Q=144/P^2$$
- where Q is the quantity demanded and P is price. Its average variable cost is
- $$AVC=Q^{1/2}$$
- and its fixed cost is 5.
- What are its profit-maximizing price and quantity?
 - Suppose the government regulates the price to be no greater than \$4 per unit. How much will the monopolist produce? What will its profit be?
 - Suppose the government wants to set a ceiling price that induces the monopolist to produce the largest possible output. What price will accomplish this goal?
6. (10 points) For this question, assume that the economy is initially operating at the natural level of output. What effects will a simultaneous increase in taxes and increase in the money supply have on output and investment in the medium run?
7. (12 points) In the short run, what effects will a reduction in the price of oil have on output and the interest rate? In the medium run, what effects will the reduction in the price of oil have on unemployment rate?
8. (10 points) Assume an economy with a production function represented by $Y = F(K, NA)$, where Y denotes outputs, K denotes capital stocks, N denotes labors, and A denotes the effectiveness of labors. The rate of capital depreciation is 10% per year, the population growth rate is 2% per year, and the growth rate of technology is 3% per year.
- Refer to the information above.
- What is the annual growth rate of "effective labor" in the steady state in this economy?
 - What is the level of investment needed to maintain constant capital per effective worker (K/NA) in this economy?
 - What is the steady-state growth rate of output in this economy?
 - What is the steady-state growth rate of output per worker in this economy?
9. (10 points) Suppose an economy experiences a reduction in productivity. What are both the short-run and medium-run effects of this reduction in productivity on



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output and the unemployment rate?

10. (4 points) Suppose firms expect future output to be higher and future interest rates to be higher. Given this information, how will firms alter investment in the current period?
11. (4 points) How could an increase in expected future output affect current output?



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系所：財金系
科目：微積分(3)

本試題共 10 題，每題 10 分，共計 100 分。

1. Find the Taylor series for the function $\frac{x}{1+3x^2}$ and specify the interval of convergence.
2. Find the average value of the function $f(x, y) = xe^y$ on the triangle with vertices $(0, 0)$, $(1, 0)$, and $(1, 1)$.
3. The highway department is planning to build a picnic area for motorists along a major highway. It is to be rectangular with an area of 5,000 square yards and is to be fenced off on the three sides not adjacent to the highway. What is the least amount of fencing that will be needed to complete the job?
4. An oil well that yields 300 barrels of crude oil a month will run dry in 3 years. It is estimated that t months from now the price of crude oil will be $P(t) = 18 + 0.3\sqrt{t}$ dollars per barrel. If the oil is sold as soon as it is extracted from the ground, what will the total future revenue from the well be?
5. Find $\int 9(x^2 + 3x + 5)^8 (2x + 3) dx$.
6. Let $f(x) = (1 + x)e^x$. Evaluate $f'(0)$.
7. $\lim_{x \rightarrow 1} \frac{x^2 - 1}{\sqrt{3x - 2} - \sqrt{2x - 1}} = ?$
8. Find the maximum value of the objective function $f(x, y) = x^{0.4}y^{0.6}$ subject to the constraints: $x > 0$, $y > 0$, and $2x + 3y = 5$.
9. Let $f(x) = 2x \ln x - x$. Evaluate $\int_1^e f(x) dx$.
10. $\sum_{n=1}^{\infty} \frac{1}{n^2 + 5n + 6} = ?$