

國立中山大學 115 學年度 碩士班考試入學招生考試試題

科目名稱：經濟學【企管系企管甲班碩士班甲組、乙組、丙組】

— 作答注意事項 —

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答。
- 答案卡請以 2B 鉛筆劃記，不可使用修正液（帶）塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶書籍、紙張（應考證不得做計算紙書寫）、具有通訊、記憶、傳輸或收發等功能之相關電子產品或其他有礙試場安寧、考試公平之各類器材入場。
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- 違規者依本校招生考試試場規則及違規處理辦法處理。

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選擇題共 20 題，每題 5 分(單選題)

1. Suppose the price of a good decreases from \$100 to \$60, and its quantity demanded increases from 45 units to 55 units. According to the **midpoint method**, what is the price elasticity of demand?

(A) -0.25
(B) -0.4
(C) -2.5
(D) -4
2. Assume Country A has no technological progress and its current capital labor ratio (capital per capita) is higher than the capital labor ratio under the **Golden Rule**. If the country's savings rate increases, according to the **Solow Model**, in the long run:

(A) Both output per capita and consumption per capita will rise.
(B) Both output per capita and consumption per capita will fall.
(C) Output per capita will rise, but consumption per capita will fall.
(D) Output per capita will fall, but consumption per capita will rise.
3. Suppose the Home country can produce 10 units of X or 20 units of Y, while the Foreign country can produce 10 units of X or 10 units of Y, and both countries engage in international trade. Now, technological progress occurs in the Foreign country's production of Y, making it identical to the Home country (i.e., Foreign can now produce 10 units of X or 20 units of Y). Which of the following statements is **FALSE**?

(A) After technological progress, the two countries can no longer benefit from international trade.
(B) After technological progress, the relative prices of products within both countries are the same.
(C) After technological progress, the welfare level of the Home country decreases.
(D) After technological progress, the welfare level of the Foreign country remains unchanged.
4. Xiao Ding is a **risk lover** regarding wealth. Which of the following is correct?

(A) Xiao Ding's marginal utility of wealth decreases as wealth increases.
(B) Xiao Ding's marginal utility of wealth remains unchanged as wealth increases.
(C) Xiao Ding's marginal utility of wealth increases as wealth increases.
(D) Xiao Ding's marginal utility of wealth first decreases and then increases as wealth increases.
5. In a perfectly competitive market, the marginal cost of production for all firms is $0.2X$. Each unit of X produced causes environmental pollution, resulting in a social damage cost of \$2. The consumer demand curve for X is $P = 6 - 0.2X$. If the government imposes a pollution tax to internalize the external cost, what should be the tax per unit of X and the resulting output level?

(A) (1, 10)
(B) (1, 20)

試題請隨卷繳回，請留意背面是否有題

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- (C) (2, 20)
- (D) (2, 10)

6. When a **deflationary gap** (recessionary gap) exists, according to the **expectations-augmented Phillips curve**, which of the following is correct?
- (A) Expected inflation rate is greater than the actual inflation rate.
 - (B) Expected inflation rate is equal to the actual inflation rate.
 - (C) Expected inflation rate is less than the actual inflation rate.
 - (D) The relationship between the expected and actual inflation rates is uncertain.
7. Suppose money demand is influenced by interest rates and income, the income elasticity of money demand is 2, and the inflation rate is 2%. Assuming that the velocity of money and short-term interest rates are both fixed, and the real annual economic growth rate is 3%, according to the **quantity equation of money**, what should be the annual growth rate of the money supply by the central bank?
- (A) 7%
 - (B) 8%
 - (C) 9%
 - (D) 10%
8. Suppose a profit-maximizing theme park adopts a **two-part tariff** pricing strategy, where consumers pay an entrance fee to get in and then a separate fee for each ride they play. Compared to a "single pricing model" (like an all-inclusive ticket), which of the following is **NOT** a result of the two-part tariff?
- (A) The firm's profit is higher.
 - (B) Consumers' utility is higher.
 - (C) Consumer surplus is lower.
 - (D) Producer surplus is higher.
9. Based on the framework of the **Mundell-Fleming** model, which of the following statements regarding the **BP line** (Balance of Payments equilibrium) is correct?
- (A) The BP line becomes flatter as the degree of capital mobility increases.
 - (B) The area above the BP line indicates a balance of payments deficit.
 - (C) The BP line has a positive slope and is flatter than the LM line.
 - (D) Assuming Purchasing Power Parity holds, a devaluation of the local currency will shift the BP line to the right.
10. What is the reason why **short-run marginal cost (SRMC)** eventually rises as output increases?

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- (A) Purchasing more variable inputs from the market requires paying a higher price.
- (B) Increasing output requires using a larger quantity of variable inputs.
- (C) As output increases, the fixed cost allocated to each unit of output also increases.
- (D) Variable inputs exhibit the characteristic of diminishing marginal returns.

11. In an oligopoly market, there are only two firms. Both firms have the same cost function: $TC = 3Q$, where TC is total cost and Q is output. The market demand function is $Q = 10 - P$, where Q is quantity consumed and P is price. If the competition mode between these two firms is the **Bertrand competition model**, what are the equilibrium price and quantity?

- (A) Equilibrium price is \$3, equilibrium quantity is 7.
- (B) Equilibrium price is \$3, equilibrium quantity is 14.
- (C) Equilibrium price is \$7, equilibrium quantity is 3.
- (D) Equilibrium price is \$7, equilibrium quantity is 6.

12. Under which of the following circumstances is it appropriate to use the **Stackelberg model** instead of the **Cournot model** to analyze the interaction between firms?

- (A) Firms determine their output levels according to a "first-come, first-served" (sequential) order.
- (B) All firms enter the market and determine their output levels simultaneously.
- (C) When there are more than two firms in the market.
- (D) Firms determine their prices according to a sequential order.

13. Assume other conditions remain constant and both the government's fiscal policy and the central bank's monetary policy are effective. According to the **IS-LM model**, when the government cuts taxes and the central bank sells bonds, which of the following statements is correct?

- (A) Equilibrium income will increase.
- (B) Equilibrium income will decrease.
- (C) Equilibrium interest rate will rise.
- (D) Equilibrium interest rate will fall.

14. The selling price of a product is \$1,000 per unit, which is exactly equal to its cost. There are three potential customers: A, B, and C, with willingness-to-pay (WTP) of \$1,500, \$1,200, and \$1,000, respectively. If the government imposes a tax of \$300 per unit on the transaction, and the seller raises the price to \$1,300, what is the **deadweight loss (DWL)** caused by this tax?

- (A) 200
- (B) 300
- (C) 500
- (D) 600

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15. On the X-Y coordinate plane, where the X-axis represents the quantity of labor and the Y-axis represents the quantity of capital. If the isoquant is a **vertical line**, which of the following statements is correct?
- (A) Labor and capital are substitutable in the firm's production process.
 - (B) Labor and capital must be used in fixed proportions to produce the product.
 - (C) Capital has no effect on the firm's production.
 - (D) Labor has no effect on the firm's production.
16. In the framework of the **IS-LM model**, which of the following statements regarding the **crowding-out effect** is correct?
- (A) The crowding-out effect increases as the IS curve becomes steeper.
 - (B) The crowding-out effect decreases as the LM curve becomes flatter.
 - (C) It describes the negative impact on investment caused by rising interest rates due to tight monetary policy.
 - (D) It describes the negative impact on consumption caused by rising interest rates due to an expansion of government spending.
17. Assume Company A's marginal product of capital (MPK) is 5% and the real interest rate is 1%. Company A's stock market value is \$2,000, its capital stock is 15 units, and the price per unit of capital is \$100. According to Company A's Tobin's Q Ratio, which of the following statements is correct?
- (A) Tobin's Q is greater than 1; Company A should decrease capital investment.
 - (B) Tobin's Q is greater than 1; Company A should increase capital investment.
 - (C) Tobin's Q is less than 1; Company A should decrease capital investment.
 - (D) Tobin's Q is less than 1; Company A should increase capital investment.
18. Dividing national income into four components: private consumption, domestic investment, government consumption, and net exports, is known as which measurement method?
- (A) Value-added approach
 - (B) Expenditure approach
 - (C) Income approach
 - (D) Final products approach
19. Regarding the views of the **Classical school** on production and employment, which of the following statements is **FALSE**?
- (A) The utility function of labor determines the firm's demand for labor.
 - (B) The determination of real output is independent of the nominal money supply.
 - (C) The equilibrium nominal wage is related to the marginal productivity of labor and the price level.

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(D) Wages have perfect upward and downward flexibility; therefore, the aggregate supply (AS) curve is vertical.

20. Regarding a **perfectly competitive market**, which of the following statements is **FALSE**?

- (A) The slope of the overall market demand curve may be negative.
- (B) The slope of the overall market short-run supply curve cannot be negative.
- (C) The slope of the demand curve faced by an individual firm may be negative.
- (D) The slope of an individual firm's short-run supply curve cannot be negative.

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一、複選題（共 15 題，每題五分，合計 75 分。每題有五個選項，答錯 k 個選項者，得該題全部分數的 $(5-2k)/5$ ，得分低於零分或所有選項均未作答者，該題以零分計算。）

Use the tables of probability distribution in Appendix as needed

1. Let X be a random variable with the following probability mass function:

$$f(x) = \binom{5}{x} p^x (1-p)^{5-x}, \quad x = 0, 1, 2, 3, 4, 5$$

A random sample X_1, X_2, \dots, X_{50} is drawn independently from this distribution, and the sample results are summarized as follows:

x	0	1	2	3	4	5
Frequency	4	10	14	12	8	2

Which statements are correct?

- (A) The sample mean is 2.32, so the MLE is $\hat{p} = 2.32$
- (B) $\hat{p} = 0.464$
- (C) The MLE of $P(X \geq 3)$ is 0.433
- (D) The MLE of $P(X \geq 3)$ is 0.493
- (E) $\sum_{i=1}^{50} X_i = 116$

2. Assume each observation $X_i, i = 1, \dots, 64$ is randomly drawn from a population with a continuous uniform distribution in $[1, 5]$. Which statements are correct?

- (A) $E(\bar{X}) = 3$
- (B) $\text{Var}(\bar{X}) = \frac{1}{48}$
- (C) $\text{SD}(\bar{X}) \approx 0.208$
- (D) $P(\bar{X} > 3.2) \approx 0.083$
- (E) $P(X_1 > 3.2) = 0.58$

3. A quality engineer defines a normalized impurity index X for a production line, where $0 \leq x \leq 1$. The pdf of X is

$$f(x) = a + bx, \quad 0 \leq x \leq 1,$$

and it is known that the mean is

$$E(X) = \mu = \frac{3}{5}$$

Which of the following statements are correct?

- (A) $a = \frac{2}{5}$, and $b = \frac{6}{5}$
- (B) $E(X^2) = \frac{1}{2}$
- (C) $P(0 < X < 0.4) = 0.256$
- (D) $P(X > 0.3 \mid X \leq 0.8) = 0.753$
- (E) $\text{Var}(X) = \frac{11}{150}$

4. The reaction time (in milliseconds) of 6 randomly selected users are recorded. Let \bar{Y} denote their average. Assume that the distribution from which the Y_i 's were drawn is normal with a mean of 250 and a standard deviation of 46. Which statements are correct?

- (A) The probability that \bar{Y} will exceed 260 is approximately 0.297
- (B) The probability that \bar{Y} will exceed 260 is approximately 0.347
- (C) The probability that any arbitrary Y_i will exceed 260 is approximately 0.414

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- (D) The probability that any arbitrary Y_i will exceed 260 is approximately 0.577
(E) $SD(\bar{Y}) \approx 18.78$

5. A simple random sample is taken. The sample size is $n=64$, the sample mean is $\bar{x}=52.5$, the sample standard deviation is $s=7.8$, and the population standard deviation is known to be $\sigma=8$. Which statements are correct?

- (A) The standard error is 1.
(B) The 95% confidence interval for the population mean μ is (50.54, 54.46)
(C) The margin of error is 1.64
(D) The 95% confidence interval for the population mean μ is (49.42, 55.58)
(E) To increase the confidence level to 99% without increasing the interval width, the sample size should be increased from 64 to 111.

6. A company studies the relationship between training hours X and monthly productivity score Y for its employees. A random sample of $n=25$ employees produced the following summary statistics:

Note: $t_{0.025,23} \approx 2.069$

$$\sum X_i = 750, \sum Y_i = 2000, \sum X_i^2 = 23700, \sum Y_i^2 = 164800, \sum X_i Y_i = 61800.$$

Assume the simple linear regression model:

$$Y = \alpha + \beta X + \varepsilon, \quad \varepsilon \sim N(0, \sigma^2)$$

Which statements are correct?

- (A) $\bar{X} = 30$ and $\bar{Y} = 80$
(B) The sample correlation is $\gamma = 0.75$, so $H_0: \rho = 0$ is rejected at $\alpha = 0.05$
(C) The least-squares line is $\hat{Y} = 35 + 1.50X$
(D) The coefficient of determination is $R^2 = 0.75$
(E) The least-squares line is $\hat{Y} = 80 + 1.50X$

7. Following the Q6, for a new employee with $X_0 = 34$, which statements are correct?

- (A) The 95% prediction interval is the same as the 95% confidence interval for the mean response at $X_0 = 34$
(B) The 95% prediction interval for an individual new observation Y_0 at $X_0 = 34$ is approximately (65.7, 106.3).
(C) The point prediction is $\hat{Y}(34) = 86$
(D) $R^2 = 0.5625$
(E) $SSE=2700$

8. Let A, B, C be three events. Suppose that B and C are independent.

Given:

$$P(B) = \frac{3}{5}, \quad P(C) = \frac{1}{2}, \quad P(A|C) = \frac{1}{5}, \quad P(A|B \cap C) = \frac{1}{10}$$

Which of the following statements are correct?

- (A) $P(C|B) = \frac{3}{5}$
(B) $P(C|B) = \frac{2}{5}$

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(C) $P(A | B^c \cap C) = \frac{3}{10}$, where B^c is the complement of B .

(D) $P(A | B^c \cap C) = \frac{7}{20}$, where B^c is the complement of B .

(E) $P(A \cap C | B) = \frac{1}{20}$

9. An online show host sparked controversy after making inappropriate remarks. The subscription rate was 9% before the incident and dropped to 6% afterward. Both surveys used a sample size of 600. Which of the following statements are correct?

(A) The standard error is approximately 0.0097

(B) The 99% critical value is 1.96.

(C) The margin of error is approximately 0.025

(D) The 99% confidence interval is (0.041, 0.079)

(E) The 99% confidence interval is (0.035, 0.085)

10. A renewable-energy developer believes there is a 0.35 probability that a proposed site has high wind potential. She commissions a screening survey that is 85% reliable, meaning it makes the correct prediction 85% of the time.

Let H : the site truly has high wind potential,
 S : the survey predicts "high wind potential."

Which statements are correct?

(A) $P(S \cap H) = 0.2975$.

(B) $P(S) = 0.395$

(C) $P(H^c | S) = 0.1765$

(D) $P(S | H^c) = 0.85$

(E) $P(S^c \cap H^c) = 0.5525$

11. Customers arrive at a coffee kiosk according to an approximate Poisson process with mean rate $\lambda = 15$ customers per hour. Which of the following statements are correct?

(A) The probability that the barista will have to wait more than 4 minutes for the arrival of the first customer is 0.223.

(B) The probability that the barista will have to wait more than 4 minutes for the arrival of the first customer is 0.368.

(C) The probability that the barista will have to wait more than 20 minutes for the arrival of the 4th customer is 0.175.

(D) The probability that the barista will have to wait more than 20 minutes for the arrival of the 4th customer is 0.265.

(E) The probability that the barista will have to wait more than 20 minutes for the arrival of the 4th customer is 0.040.

12. Which of the following statements about hypothesis testing and confidence intervals are correct?

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- (A) A Type I error occurs when we fail to reject H_0 even though H_0 is false.
- (B) A Type II error occurs when we do not reject H_0 even though H_0 is false.
- (C) The power of a test equals $1-\beta$, i.e., the probability of rejecting H_0 when H_0 is false.
- (D) A 95% confidence interval means there is a 95% probability that the true parameter lies in the computed interval.
- (E) Decreasing the significance level α (with everything else fixed) generally reduces the probability of a Type I error.

13. Which of the following graphical displays are typically used to summarize the distribution of a single quantitative (numerical) variable?

- (A) Histogram
- (B) Stem-and-leaf plot
- (C) Box-and-whisker plot (boxplot)
- (D) Scatterplot
- (E) Pareto chart

14. A hiker is lost in a desert. Each time the hiker reaches the same landmark, they choose to walk East or West with equal probability 0.50. If the hiker walks East, they return to the landmark after 4 hours (still not rescued). If the hiker walks West, then with probability 0.3 they are rescued after 3 hours; otherwise, with probability 0.7 they return to the landmark after 6 hours (still not rescued). Let T be the total time (in hours) until rescue. Which statements are correct?

- (A) $E(T)=16.74$
- (B) $E(T)=30.33$
- (C) $Var(T)=240.67$
- (D) $Var(T)=884.44$
- (E) $SD(T)=15.49$

15. A factory packs light bulbs into a box. The box contains 8 good bulbs and 5 defective bulbs. Let X be the number of good bulbs selected when 4 bulbs are chosen. Consider both sampling methods: without replacement and with replacement. Which of the following statements are correct?

- (A) If sampled without replacement, $Var(X)=1.947$
- (B) If sampled without replacement, $Var(X)=0.710$
- (C) If sampled with replacement, $P(X \text{ is odd})=0.499$
- (D) If sampled with replacement, $P(X \text{ is odd})=0.544$
- (E) If sampled with replacement, $P(X \text{ is odd})=0.725$

二、單選題 (共 5 題，每題五分，合計 25 分。)

16. A pharmaceutical company compares the tablet weight (in grams) produced by Line A and Line B. Let X and Y denote tablet weights from Line A and Line B, respectively. Assume

$$X \sim N(\mu_X, \sigma_X^2), \quad Y \sim N(\mu_Y, \sigma_Y^2),$$

and the two samples are independent.

國立中山大學 115 學年度碩士班考試入學招生考試試題

科目名稱：商用統計學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】題號：441002

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（選擇題） 共 7 頁第 5 頁

A random sample of 8 tablets from Line A gave:

1.012	1.008	1.015	1.020	1.009	1.017	1.011	1.018
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A random sample of 7 tablets from Line B gave:

1.005	1.002	1.010	1.007	1.001	1.009	1.004
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Test $H_0: \sigma_X^2 = \sigma_Y^2$ versus $H_1: \sigma_X^2 \neq \sigma_Y^2$ at $\alpha = 0.10$. Which statement is correct?

- (A) Reject H_0 because $F \approx 5.12$
- (B) Reject H_0 because $F \approx 3.90$
- (C) Fail to reject H_0 because $F \approx 1.67$
- (D) Fail to reject H_0 because $F \approx 0.60$
- (E) The test cannot be performed without knowing μ_X and μ_Y

17. Following the Q16, which option is closest to the 95% confidence interval for $\mu_X - \mu_Y$?

Note: $t_{0.975,13} \approx 2.160$

- (A) (0.0020, 0.0140)
- (B) (0.0039, 0.0128)
- (C) (0.0008, 0.0158)
- (D) (-0.0010, 0.0170)
- (E) (0.0060, 0.0100)

18. A delivery company drops 6 identical packages independently into 8 storage lockers. Each package is equally likely to go into any locker. Let X be the number of lockers that receive at least one package. What is $E[X]$? (Choose the closest value.)

- (A) 3.307
- (B) 6.576
- (C) 3.938
- (D) 3.590
- (E) 4.410

19. A car manufacturer studies the relationship between driving speed X (km/h) and braking distance Y (meters) under controlled road conditions. A random sample of 10 tests produced the following data:

Test	1	2	3	4	5	6	7	8	9	10
(X)	30	40	45	50	55	60	65	70	80	90
(Y)	2.1	2.4	3.1	3.0	4.2	4.0	4.9	5.0	5.4	6.6

Assume the simple linear regression model:

$$Y = \alpha + \beta X + \varepsilon, \quad \varepsilon \sim N(0, \sigma^2)$$

Which estimated regression equation is closest to the least-squares line?

- (A) $\hat{Y} = -0.4274 + 0.0763X$
- (B) $\hat{Y} = -0.4763 + 0.0900X$
- (C) $\hat{Y} = -0.7635 + 0.0900X$
- (D) $\hat{Y} = -0.2500 + 0.0680X$
- (E) $\hat{Y} = -0.3963 + 0.0763X$

國立中山大學 115 學年度碩士班考試入學招生考試試題

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20. Following the Q19, which value is closest to R^2 ?

- (A) 0.842
- (B) 0.908
- (C) 0.962
- (D) 0.992
- (E) 0.672

Appendix

Table 1: The Critical values for F-distribution at (df1, df2) degree of freedom, given alpha=0.10

\	df ₁ =1	2	3	4	5	6	7	8	9	10
df ₁ =1	39.86346	49.5	53.59324	55.83296	57.24008	58.20442	58.90595	59.43898	59.85759	60.19498
2	8.52632	9	9.16179	9.24342	9.29263	9.32553	9.34908	9.36677	9.38054	9.39157
3	5.53832	5.46238	5.39077	5.34264	5.30916	5.28473	5.26619	5.25167	5.24	5.23041
4	4.54477	4.32456	4.19086	4.10725	4.05058	4.00975	3.97897	3.95494	3.93567	3.91988
5	4.06042	3.77972	3.61948	3.5202	3.45298	3.40451	3.3679	3.33928	3.31628	3.2974
6	3.77595	3.4633	3.28876	3.18076	3.10751	3.05455	3.01446	2.98304	2.95774	2.93693
7	3.58943	3.25744	3.07407	2.96053	2.88334	2.82739	2.78493	2.75158	2.72468	2.70251
8	3.45792	3.11312	2.9238	2.80643	2.72645	2.66833	2.62413	2.58935	2.56124	2.53804
9	3.3603	3.00645	2.81286	2.69268	2.61061	2.55086	2.50531	2.46941	2.44034	2.41632
10	3.28502	2.92447	2.72767	2.60534	2.52164	2.46058	2.41397	2.37715	2.34731	2.3226
11	3.2252	2.85951	2.66023	2.53619	2.45118	2.38907	2.34157	2.304	2.2735	2.24823
12	3.17655	2.8068	2.60552	2.4801	2.39402	2.33102	2.28278	2.24457	2.21352	2.18776
13	3.13621	2.76317	2.56027	2.43371	2.34672	2.28298	2.2341	2.19535	2.16382	2.13763
14	3.10221	2.72647	2.52222	2.39469	2.30694	2.24256	2.19313	2.1539	2.12195	2.0954
15	3.07319	2.69517	2.48979	2.36143	2.27302	2.20808	2.15818	2.11853	2.08621	2.05932
16	3.04811	2.66817	2.46181	2.33274	2.24376	2.17833	2.128	2.08798	2.05533	2.02815
17	3.02623	2.64464	2.43743	2.30775	2.21825	2.15239	2.10169	2.06134	2.02839	2.00094
18	3.00698	2.62395	2.41601	2.28577	2.19583	2.12958	2.07854	2.03789	2.00467	1.97698
19	2.9899	2.60561	2.39702	2.2663	2.17596	2.10936	2.05802	2.0171	1.98364	1.95573
20	2.97465	2.58925	2.38009	2.24893	2.15823	2.09132	2.0397	1.99853	1.96485	1.93674
21	2.96096	2.57457	2.36489	2.23334	2.14231	2.07512	2.02325	1.98186	1.94797	1.91967
22	2.94858	2.56131	2.35117	2.21927	2.12794	2.0605	2.0084	1.9668	1.93273	1.90425
23	2.93736	2.54929	2.33873	2.20651	2.11491	2.04723	1.99492	1.95312	1.91888	1.89025
24	2.92712	2.53833	2.32739	2.19488	2.10303	2.03513	1.98263	1.94066	1.90625	1.87748
25	2.91774	2.52831	2.31702	2.18424	2.09216	2.02406	1.97138	1.92925	1.89469	1.86578

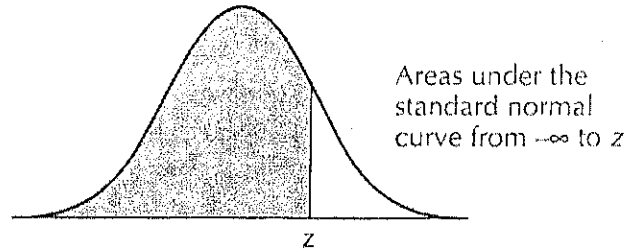
國立中山大學 115 學年度碩士班考試入學招生考試試題

科目名稱：商用統計學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】題號：441002

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Table 2: Cumulative probability of the standard normal distribution



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.00	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.10	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.20	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.30	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.40	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.50	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.60	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.70	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.80	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8079	0.8106	0.8133
0.90	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.00	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.10	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.20	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.30	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.40	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.50	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.60	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.70	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.80	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.90	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.00	0.9773	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.10	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.20	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.30	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.40	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.50	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.60	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.70	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.80	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.90	0.9981	0.9982	0.9983	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.00	0.99865	0.99869	0.99874	0.99878	0.99882	0.99886	0.99889	0.99893	0.99897	0.99900
3.10	0.99903	0.99907	0.99910	0.99913	0.99916	0.99918	0.99921	0.99924	0.99926	0.99929
3.20	0.99931	0.99934	0.99936	0.99938	0.99940	0.99942	0.99944	0.99946	0.99948	0.99950
3.30	0.99952	0.99953	0.99955	0.99957	0.99958	0.99960	0.99961	0.99962	0.99964	0.99965
3.40	0.99966	0.99968	0.99969	0.99970	0.99971	0.99972	0.99973	0.99974	0.99975	0.99976
3.50	0.99977	0.99978	0.99978	0.99979	0.99980	0.99981	0.99982	0.99982	0.99983	0.99984
3.60	0.99984	0.99985	0.99985	0.99986	0.99986	0.99987	0.99987	0.99988	0.99988	0.99989
3.70	0.99989	0.99990	0.99990	0.99990	0.99991	0.99991	0.99992	0.99992	0.99992	0.99993
3.80	0.99993	0.99993	0.99993	0.99994	0.99994	0.99994	0.99994	0.99995	0.99995	0.99995
3.90	0.99995	0.99995	0.99996	0.99996	0.99996	0.99996	0.99996	0.99996	0.99997	0.99997
4.00	0.99997	0.99997	0.99997	0.99997	0.99997	0.99997	0.99998	0.99998	0.99998	0.99998

國立中山大學 115 學年度 碩士班考試入學招生考試試題

科目名稱：微積分【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】

— 作答注意事項 —

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答。
- 答案卡請以 2B 鉛筆劃記，不可使用修正液（帶）塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶書籍、紙張（應考證不得做計算紙書寫）、具有通訊、記憶、傳輸或收發等功能之相關電子產品或其他有礙試場安寧、考試公平之各類器材入場。
- 試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。
- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

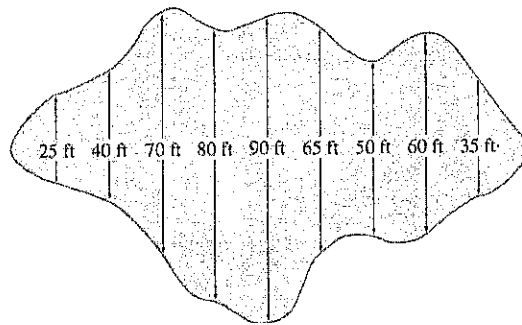
國立中山大學 115 學年度碩士班考試入學招生考試試題

科目名稱：微積分【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】 題號：441003
 ※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（問答申論題） 共 2 頁第 1 頁

請依題號順序將答案寫在答案卷上，並列出完整計算或推導過程，違者不予計分。

Q1. (5 + 5 = 10%)

Consider a lake with the shape depicted in the following figure. The measurements shown are taken 15-ft interval. Please use respectively the rules of (i) Trapezoidal and (ii) Simpson with $n = 10$ to estimate the area of the lake.



Q2. (10%)

Please evaluate the following integral:

$$\int_0^1 e^{-\sqrt{x}} dx$$

Q3. (10%)

Please find the area of the region bounded by the graphs of the two functions $f(x) = x^2 - 2x - 1$ and $g(x) = -e^x - 2$, as well as the two vertical lines $x = -1$ and $x = 1$.

Q4. (10%)

Please evaluate the following integral:

$$\int_0^1 \frac{1}{x + x^{0.5}} dx$$

Q5. (10%)

Please evaluate the following integral:

$$\int x(x + 1)^{0.5} dx$$

國立中山大學 115 學年度碩士班考試入學招生考試試題

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Q6. (10%)

Please sketch the graph of the following function by means of the information from its first and second derivatives:

$$f(t) = 3t^4 + 4t^3$$

Q7. (10%)

Please find the general solution of the following first-order differential equation by separating variables:

$$y' = \frac{xe^x}{2y}$$

Q8. (10%)

Please evaluate the following integral:

$$\int \cos 7x \sqrt{1 - 4 \sin 7x} dx$$

Q9. (5 + 5 = 10%)

Consider the following function:

$$f(x) = (x - 14) \ln x$$

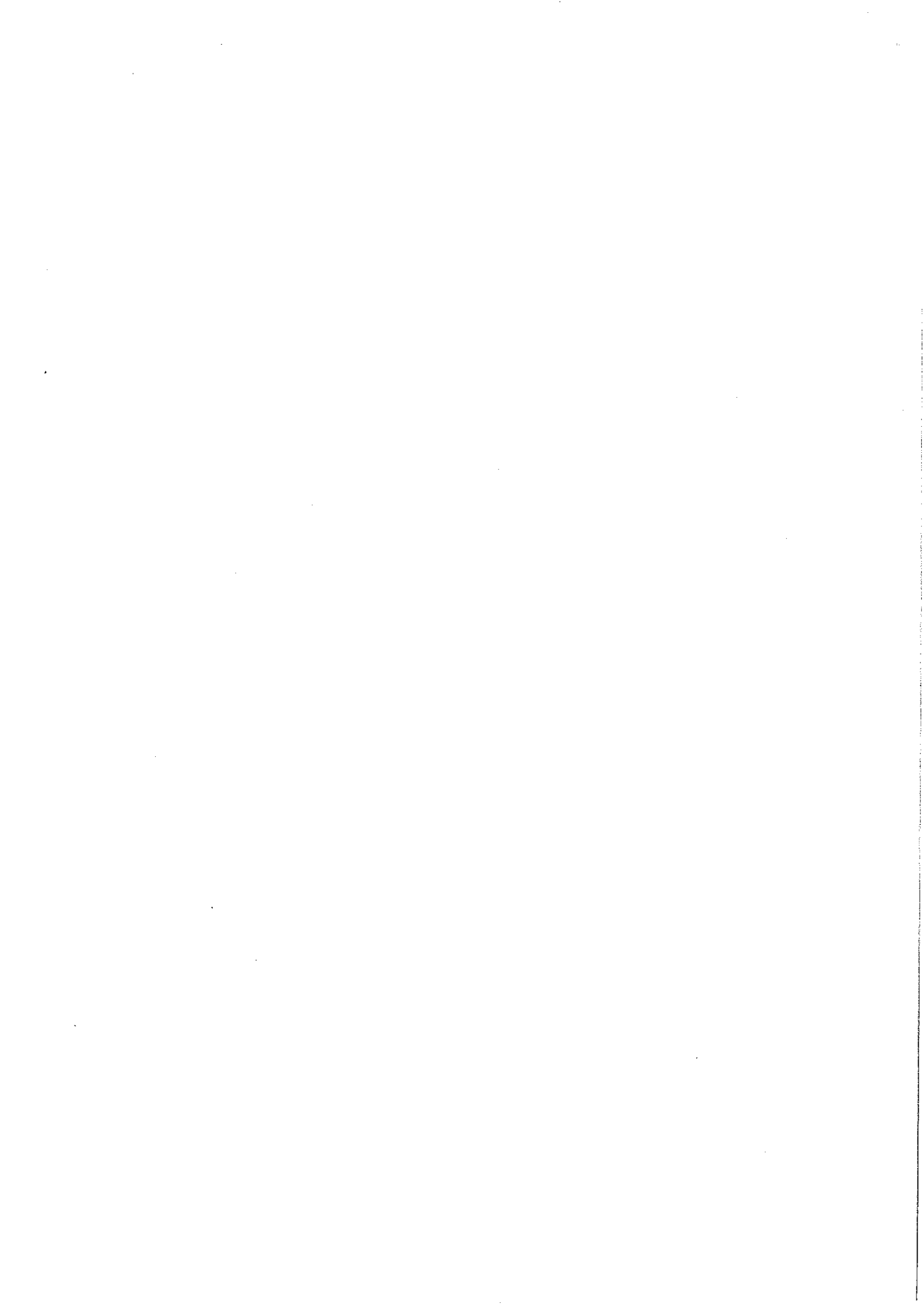
- (i) Please find the Taylor series of the function at the point $x = 14$;
- (ii) Please give the interval of convergence for the series.

Q10. (10%)

Please find the volume of the solid bounded above by the surface $z = f(x, y)$ and below by the plane region R , where

$$f(x, y) = \frac{2y}{1 + x^2}$$

and R is the region bounded by $y = 5\sqrt{x}$, $y = 0$, and $x = 4$.



國立中山大學 115 學年度 碩士班考試入學招生考試試題

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— 作答注意事項 —

考試時間：100 分鐘

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- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答。
- 答案卡請以 2B 鉛筆劃記，不可使用修正液（帶）塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶書籍、紙張（應考證不得做計算紙書寫）、具有通訊、記憶、傳輸或收發等功能之相關電子產品或其他有礙試場安寧、考試公平之各類器材入場。
- 試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。
- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

國立中山大學 115 學年度碩士班考試入學招生考試試題

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Section A. MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. 2.5% each, 70% in total.

1. A manager evaluates multiple alternatives under time and information constraints. Once an option is found that is “good enough,” the manager ends the search and makes a decision, despite knowing that better options may exist.

This behavior most clearly reflects:

- A) Intuition
- B) Escalation of commitment
- C) Satisficing
- D) Perfect rationality

2. When revising a strategy, a manager places disproportionate emphasis on a recent project failure while largely discounting long-term performance data.

This judgment error is best explained by:

- A) Confirmation bias
- B) Availability bias
- C) Anchoring bias
- D) Framing bias

3. A manager decides to permanently switch suppliers after a single delivery delay. This decision is made despite extensive historical data showing that the original supplier has performed reliably over time.

This decision is best explained by:

- A) Rational updating based on new information
- B) Neglect of base-rate information due to recent outcomes
- C) Satisficing under conditions of uncertainty
- D) Ethical risk aversion

4. Organizations facing high environmental uncertainty are most likely to benefit from which structural characteristic?

- A) High formalization
- B) Centralized authority
- C) Flexibility and decentralization
- D) Clear hierarchy

5. An organization emphasizes innovation in official messages and public statements. In day-to-day work, however, employees are rewarded primarily for compliance and error avoidance.

This pattern most clearly reflects a gap between:

- A) Artifacts and symbols
- B) Espoused values and enacted practices

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- C) National culture and organizational culture
- D) Strategy and structure

6. A multinational corporation gives its foreign subsidiaries substantial autonomy to make decisions based on local market conditions, customer preferences, and regulations.

This management orientation is best described as:

- A) Ethnocentric
- B) Polycentric
- C) Global standardization
- D) Boundaryless

7. Which characteristic is most clearly an example of deep-level diversity?

- A) Gender
- B) Age
- C) Work values
- D) Ethnicity

8. Employees report feeling demotivated because promotion decisions are made without clear, consistent, or transparent procedures.

This concern most directly reflects a problem with:

- A) Distributive justice
- B) Procedural justice
- C) Interactional justice
- D) Restorative justice

9. A firm successfully increases demographic representation across teams. However, minority employees report that they remain excluded from informal networks and influence channels.

This outcome is best explained by the fact that:

- A) Diversity initiatives reduce employee motivation
- B) Structural diversity was addressed without corresponding inclusion mechanisms
- C) Legal compliance requirements discourage participation
- D) Increased role ambiguity undermined collaboration

10. Employees resist a newly introduced system mainly because they believe it will reduce their status and threaten their job security.

This resistance is best explained by:

- A) Poor communication about the change
- B) Perceived threats to personal interests
- C) Lack of leadership vision
- D) Low organizational commitment

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11. Which factor most distinguishes an entrepreneurial opportunity from a creative idea?
- A) Originality
 - B) Personal passion
 - C) Ability to create value
 - D) Resource availability
12. An innovation spreads more rapidly when it is perceived as:
- A) Complex
 - B) Risky
 - C) Compatible with existing practices
 - D) Mandated by top management
13. Setting specific, challenging goals improves performance mainly by:
- A) Eliminating uncertainty
 - B) Increasing focus and motivation
 - C) Reducing role conflict
 - D) Enhancing control systems
14. A firm's strategy had produced strong performance for several years. After major changes in market conditions, however, the same strategy no longer leads to satisfactory results.
- This failure is most directly explained by:
- A) Declining employee skills
 - B) Poor leadership execution
 - C) Loss of strategic fit
 - D) Weak organizational culture
15. A firm attempts to compete by offering low prices while also providing highly differentiated products. Over time, operational complexity increases and profitability declines.
- This outcome is best explained by the fact that:
- A) Training investment was insufficient
 - B) Strategic trade-offs were ignored
 - C) Environmental uncertainty increased
 - D) Incentives were poorly designed
16. Two firms adopt similar competitive strategies and operate in the same industry. Over time, however, only one firm is able to sustain superior performance.
- This difference is best explained by:
- A) Favorable market timing
 - B) Differences in underlying resources and capabilities
 - C) Stronger ethical leadership
 - D) Larger organizational size

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17. A matrix structure is most likely to create which coordination challenge?
- A) Clear authority lines
 - B) Dual reporting relationships
 - C) Reduced communication
 - D) Centralized control
18. Decentralization primarily increases which organizational outcome?
- A) Formalization
 - B) Managerial workload
 - C) Flexibility and responsiveness
 - D) Bureaucratic control
19. Highly routine and standardized tasks are best supported by which structure?
- A) Organic
 - B) Network
 - C) Mechanistic
 - D) Boundaryless
20. Structured interviews improve hiring quality mainly because they increase:
- A) Applicant comfort
 - B) Predictive validity
 - C) Managerial discretion
 - D) Speed of decision making
21. In a team setting, members begin to exert less effort after realizing that their individual contributions cannot be clearly identified or evaluated.
- This behavior is best described as:
- A) Groupthink
 - B) Process loss
 - C) Social loafing
 - D) Role ambiguity
22. In a team, members avoid questioning dominant viewpoints in order to maintain harmony and avoid conflict. As a result, the team makes poor decisions.
- This pattern most clearly illustrates:
- A) Group norms
 - B) Group polarization
 - C) Groupthink
 - D) Cohesion
23. A manager delivers instructions and assumes they are understood, but does not verify whether the message was correctly received or interpreted. As a result, communication breaks down.
- This failure most directly reflects a problem with:
- A) Channel selection

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- B) Feedback
- C) Encoding
- D) Listening

24. Nonverbal cues are especially important because they:

- A) Replace verbal messages
- B) Reduce ambiguity in communication
- C) Are culture-free
- D) Increase formal authority

25. To gain approval for a proposal, a manager cultivates relationships, forms coalitions, and mobilizes informal support across departments instead of relying on formal authority or positional power.

This behavior most clearly reflects:

- A) Legitimate power
- B) Coercive power
- C) Political skill
- D) Reward power

26. A leader deliberately adapts their leadership style across different teams. However, when working with highly experienced employees, the leader fails to gain commitment and engagement.

This outcome is best explained by:

- A) A lack of charismatic appeal
- B) A misalignment between leadership style and follower readiness
- C) Excessive delegation of authority
- D) A weak or unclear vision

27. When making decisions, a manager relies on a few success stories rather than systematically collected performance data.

What is the strongest critique of this approach?

- A) Using data eliminates the need for managerial judgment
- B) Anecdotal evidence provides more accurate causal explanations
- C) Ignoring systematic evidence increases the risk of biased decisions
- D) Statistical analysis requires specialized technical expertise

28. An organization introduces individual performance bonuses. In the short term, employee output increases. Over time, however, collaboration declines and overall performance worsens.

Which explanation best integrates these outcomes?

- A) Employees generally lack intrinsic motivation
- B) The reward system crowded out cooperative norms
- C) Performance goals were poorly defined
- D) Monitoring mechanisms were insufficient

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Section B. SHORT ESSAY. Write up your answers in English or in Chinese. 30% in total.

Below is an excerpt adapted from the Wall Street Journal article “Why AI Will Widen the Gap Between Superstars and Everybody Else” (Call, October 12, 2025).

Workplace tensions and resentment may increase if top performers benefit more from artificial intelligence (AI) tools than other employees. While conventional wisdom suggests AI will level the playing field, research indicates that AI often amplifies existing differences. When new productivity tools arrive, it is usually the most capable and experienced employees who master them first and find creative ways to use them more effectively. In contrast, average employees tend to stick to basic functions and adopt tools more slowly.

Employees with greater domain expertise can formulate more precise questions, critically evaluate AI outputs, and refine results through multiple iterations. As a result, they are more likely to extract valuable insights and catch mistakes. Average performers, without such expertise, may rely on generic outputs or fail to recognize errors, limiting the usefulness of AI for their work.

In addition, high-status employees are often granted greater autonomy and discretion in their work, allowing them to experiment with AI tools earlier and more freely. If their AI experiments do not succeed, they are more likely to receive tolerance rather than criticism. When AI assistance is invisible to observers, managers and colleagues may attribute strong results to individual ability rather than the use of technology. High-status employees thus receive disproportionate credit for AI-augmented work, while similar outputs by lower-status employees may be discounted.

Without deliberate organizational actions to support all employees, AI risks creating a two-tier workforce in which a small group captures most opportunities while others fall further behind.

(The passage above has been edited for examination purposes.)

1. (10%) Summarize the main argument of the passage in your own words. If written in Chinese, the response should not exceed 150 Chinese characters; if written in English, it should not exceed 120 words. Do not copy sentences directly from the passage.
2. (10%) Under what organizational or managerial conditions might the use of AI reduce, rather than widen, differences between high-performing employees and average employees? In your answer, identify and name at least one relevant concept or theory in management, and explain in detail why the effect of AI on performance differences would change under this condition.
3. (10%) From a manager’s perspective, propose one practical action an organization could take to reduce the unequal effects of AI described in the passage, and explain the underlying logic.

Reference

- Call, M. (2025, October 12). *Why AI will widen the gap between superstars and everybody else.* The Wall Street Journal.



國立中山大學 115 學年度 碩士班考試入學招生考試試題

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— 作答注意事項 —

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答。
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