

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：統計學【財管系碩士班甲組、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。
- 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。

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題號：443001

※本科目依簡章規定「不可以」使用計算機(選擇題)

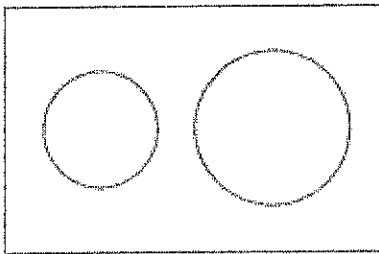
共 7 頁第 1 頁

選擇題 40 題，每題 2.5 分

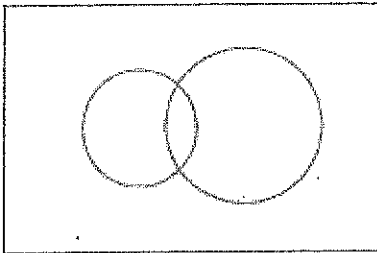
1. Suppose a discrete variable X has pmf $p_X(x) = cx$, for $x = 1, 2, \dots, 20$, and $p_X(x) = 0$ for all other values of x ; then what is the value of the constant c ?
A. $1/55$
B. $1/10$
C. $1/210$
D. $1/5$
2. Suppose a continuous variable Y has pdf $f_Y(y) = cy^2$, for $0 < y < 1$, and $f(y) = 0$ for all other values of y ; then what is the value of the constant c ?
A. $1/3$
B. 3
C. $1/2$
D. 2

3. Which of the following can NOT be a figure of two independent events?

A.



B.



- C. Both A and B
 - D. None of the above
4. Which of the following about the skewness of X is NOT correct?
A. The skewness always has value between -1 and $+1$
B. When the skewness is positive, the distribution of X skews to the right
C. The distribution of X is symmetric when the skewness $= 0$
D. If X has a normal distribution, its skewness $= 0$
 5. Which of the following about the kurtosis of X is NOT correct?
A. If X has a normal distribution, its kurtosis $= 3$
B. If X has a standard normal distribution, its kurtosis $= 3$
C. If X has a kurtosis value > 3 , there are more extreme values in X than can be given by a normal distribution
D. Statistical programs like Excel, R, Python and Matlab use the same definition of kurtosis

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6. Which of the following is different from the other three?
 - A. Two random variables X and Y are independent
 - B. $E[Y|X] = E[X]$
 - C. $g(X)$ and $h(Y)$ are independent for all functions g and h
 - D. $E[XY] = E[X]E[Y]$
7. In which of the following we can reject the null hypothesis of Jarque-Bera test at $\alpha = 5\%$?
 - A. The test statistic $JB = 0$
 - B. The test statistic $JB = 40$
 - C. The p value is 7.5%
 - D. The sample skewness = 0.1 and sample kurtosis = 2.9, with sample size 800
8. About Poisson and Exponential distribution, which of the following is correct?
 - A. They are both discrete-valued distributions
 - B. For $X \sim Poi(\lambda)$, $E[X] = S. D. (X)$
 - C. For $X \sim Exp(\lambda)$, $E[X] = \lambda$
 - D. None of the above.
9. Which of the following about pdf and likelihood functions is correct?
 - A. In a pdf function, the value of parameter θ is fixed
 - B. For a likelihood function, we can express as: $x \mapsto f(x|\theta)$
 - C. Both pdf and likelihood function have values between 0 and 1
 - D. None of the above
10. How do we obtain the maximum likelihood estimator $\hat{\theta}_{MLE}$?
 - A. Collect data, assume a distribution and find the FOC without taking log
 - B. Collect data, assume no distribution and find the FOC of log-likelihood
 - C. Collect data, assume a distribution and find the FOC of log-likelihood
 - D. All of the above
11. Which of the following about analytical solutions to $\hat{\theta}_{MLE}$ is correct?
 - A. We cannot always obtain analytical solution to $\hat{\theta}_{MLE}$
 - B. We can obtain analytical solution to $\hat{\theta}_{MLE}$ for Bernoulli, Poisson, Exponential and normal distributions
 - C. Even if there is no analytical solution $\hat{\theta}_{MLE}$, it can still have normal distribution, provided some regularity conditions hold
 - D. All of the above
12. In deriving $E[S^2] = \sigma^2$ for a random sample $\{X_1, X_2, \dots, X_n\}$, we do NOT need which of the following?
 - A. Each X_1, X_2, \dots, X_n has normal distribution
 - B. $E[\bar{X}] = \mu$
 - C. $E[X_i^2] = \sigma^2 + \mu^2$
 - D. $Var(\bar{X}) = \sigma^2/n$
13. Which of the following about \hat{a}_{MLE} for the simple regression model $Y_i = a + bx_i + e_i$ is correct?
 - A. The standard error of \hat{a}_{MLE} is σ^2/n , where σ^2 is the variance of e_i
 - B. \hat{a}_{MLE} is a biased estimator of a
 - C. \hat{a}_{MLE} can have a normal distribution, even if Y_i does not have a normal distribution
 - D. None of the above

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共 7 頁第 3 頁

14. Which of the following is NOT a typical property of residuals e_t from regression with financial return series?
- A. The residuals have auto-correlation value close to zero, and can be positive or negative
 - B. The residuals have close to normal distribution
 - C. The square residuals have auto-correlation value positive and significantly different from zero
 - D. The residuals have sample kurtosis > 3
15. Which of the following about multiple regression is NOT correct?
- A. In multiple regression, we have several explanatory variables which can be expressed as a matrix X
 - B. We make the same assumption about the residual e_t as in simple linear regression
 - C. A multiple regression always has a solution, that is, we can always estimate the coefficients b_1, b_2, \dots, b_k
 - D. None of the above
16. Which of the following inequality is useful when we consider the difference between $E[\ln(X)]$ and $\ln(E[X])$?
- A. Markov Inequality
 - B. Chebyshev Inequality
 - C. Cauchy Inequality
 - D. Jensen's Inequality
17. According to the answer in question 16, which of the following is correct?
- A. $E[\ln(X)] > \ln(E[X])$
 - B. $E[\sqrt{X}] < \sqrt{E[X]}$
 - C. $E[X^2] < (E[X])^2$
 - D. None of the above
18. For two random variables X and Y , which of the following is NOT correct?
- A. $E[E[X|Y]] = E[X|Y]$
 - B. $\text{var}(E[X|Y]) \geq \text{var}(X)$
 - C. The marginal density $f(x)$ is given by dividing the joint density $f(x, y)$ by the conditional density $f(x|y)$
 - D. All of the above are not correct

● Conditional Expectation (for Q19 - Q23)

Let the joint pdf of X_1 and X_2 be given as:

$$f(x_1, x_2) = 21x_1^2x_2^3, 0 < x_1 < x_2 < 1$$

19. What is marginal pdf $f(x_2)$?
- A. $6x_2^6, 0 < x_2 < 1$
 - B. $7x_2^6, 0 < x_2 < 1$
 - C. $7x_2^6, x_1 < x_2 < 1$
 - D. None of the above
20. What is the conditional pdf $f(x_1|x_2)$?
- A. $2x_1^2x_2^{-3}, 0 < x_1 < x_2, \text{ with } 0 < x_2 < 1$
 - B. $5x_1^2x_2^{-3}, 0 < x_1 < x_2, \text{ with } 0 < x_2 < 1$
 - C. $3x_1^2x_2^{-3}, 0 < x_1 < x_2, \text{ with } 0 < x_2 < 1$
 - D. None of the above

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21. What is the conditional mean of X_1 , given $X_2 = x_2, 0 < x_2 < 1$?

- A. $E[X_1|x_2] = \frac{3}{4}x_2, 0 < x_2 < 1$
- B. $E[X_1|x_2] = \frac{3}{2}x_2, 0 < x_2 < 1$
- C. $E[X_1|x_2] = \frac{5}{4}x_2, 0 < x_2 < 1$
- D. None of the above

22. What is the pdf of $Y = E[X_1|X_2]$?

- A. $f(y) = 6\left(\frac{4}{3}\right)^6 y^7, 0 < y < 3/4$
- B. $f(y) = 7\left(\frac{4}{3}\right)^6 y^7, 0 < y < 3/4$
- C. $f(y) = 7\left(\frac{4}{3}\right)^7 y^6, 0 < y < 3/4$
- D. None of the above

23. What is $E[Y]$ using the pdf of Y in Q22?

- A. 21/32
- B. 28/33
- C. 25/32
- D. None of the above

● Conditional Probability (for Q24 – Q 28)

Suppose the marginal pdf of X_2 is given by:

$$f(x_2) = ax_2^4, 0 < x_2 < 1$$

And the conditional pdf of X_1 , given $X_2 = x_2$, is:

$$f(x_1|x_2) = bx_1/x_2^2, 0 < x_1 < x_2, \text{ with } 0 < x_2 < 1$$

24. What is the constant a ?

- A. 4
- B. 5
- C. 6
- D. 7

25. What is the constant b ?

- A. 7
- B. 5
- C. 3
- D. 2

26. What is the joint pdf $f(x_1, x_2)$?

- A. $10x_1x_2^2, 0 < x_1 < x_2 < 1$
- B. $5x_1x_2^2, 0 < x_1 < x_2 < 1$
- C. $12x_1^2x_2, 0 < x_1 < x_2 < 1$
- D. None of the above

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27. What is the marginal pdf $f(x_1)$?
- A. $(\frac{10}{3}x_1)(1-x_1)^3, 0 < x_1 < 1$
 - B. $(\frac{10}{3}x_1)(1-x_1^3), 0 < x_1 < 1$
 - C. $(\frac{10}{3}x_1^2)(1-x_1^3), 0 < x_1 < 1$
 - D. None of the above
28. The probability $P(0.1 < X_1 < 0.2)$ is mostly close to which of the following value?
- A. 0.06
 - B. 0.08
 - C. 0.04
 - D. 0.05
29. Which of the following has a meaning different from the other three?
- A. Matrix A is non-singular
 - B. Matrix A is a $m \times n$ matrix
 - C. Matrix A has an inverse
 - D. The determinant of matrix A exists
30. 以下何選項與其他三項意義不同?
- A. 矩陣 A 的所有欄為線性相依
 - B. 矩陣 A 的所有欄具有滿秩
 - C. 矩陣 A 為非奇異矩陣
 - D. 對此方程式系統 $Ax = y$ 我們可求得 x 之解為 $x = A^{-1}y$
31. 以下何者為正確的定義描述?
- A. 從 100 家公司選取在某一交易日之資料進行迴歸, 此為橫截面迴歸分析 (cross-sectional regression)
 - B. 從 100 家公司選取過去十年之歷史資料進行迴歸分析, 此稱為縱橫迴歸分析 (panel regression)
 - C. 從一家公司選取過去十年之歷史資料進行迴歸, 此為時間序列迴歸分析 (time-series regression)
 - D. 以上皆為正確

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● Linear Regression (for Q.32 – Q.40)

迴歸統計				
R 的倍數		0.32994		
R 平方		0.10886		
調整 R 平方		0.10846		
標準誤		(Q.35)		
觀察值個數 n		2209		

ANOVA				
	自由度	SS	MS	F
迴歸 (reg.)	(Q. 34)	0.06774	0.06774	269.60855
殘差 (residual)	(Q. 34)	0.55448	2.5124E-04	
總和 (total)	(Q. 34)	0.62222		

	係數	標準誤	t 統計	P-值
截距 (a)	0.000963	0.00033726	2.85643	0.00432
X 變數 1 (b)	0.367149	(Q. 40)	16.41976	2.980E-57

32. In this table produced by Excel, some of the values can be calculated from the summary statistics of data X (independent variable) and Y (dependent variable) directly; which of the following is correct?
- R 的倍數 = the square of sample correlation between $X = Y$
 - SS-總和 (or TSS) = $n \cdot$ sample variance of Y
 - X 變數 1 (or b) = $\frac{Cov(X,Y)}{Var(Y)}$
 - All of the above
33. Which of the following is a correct description on Method of Least Square (LS) and Maximum Likelihood Estimate (MLE) of linear regression model?
- The LS and MLE estimators of a and b values are different
 - The LS and MLE estimators of a and b values are exactly the same
 - The LS and MLE estimators of a and b values are usually different, and sometimes the same
 - The LS and MLE estimators of a and b values are usually the same, and sometimes different
34. What are the correct values of degree of freedom here?
- (2207, 1, 2208)
 - (1, 2208, 2209)
 - (2208, 1, 2209)
 - (1, 2207, 2208)
35. Which of the following is the most correct value for 標準誤 in the table?
- $\sqrt{SSR/2208}$
 - $\sqrt{MSR/2207}$
 - $\sqrt{2.5124E - 04}$
 - $0.55448/2207$

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36. The result from F test is:
- A. not significant at 1% level
 - B. significant with p value = 0.00432
 - C. significant with p value 2.98E-57
 - D. None of the above
37. Which of the following is the most appropriate use of the result that \hat{a}_{MLE} has a normal distribution?
- A. It can be directly used to test $H_0: a = 0$
 - B. It can be used to test $H_0: a = 0$ after we standardize \hat{a}_{MLE} and have $N(0, 1)$
 - C. It can be used to test $H_0: a = 0$ after we standardize \hat{a}_{MLE} and also replace σ^2 by $\hat{\sigma}_{MLE}^2$
 - D. All of the above
38. Which of the following about \hat{b}_{MLE} for the simple regression model $Y_i = a + bx_i + e_i$ is correct?
- A. \hat{b}_{MLE} can be seen as a weighted average of Y_i
 - B. \hat{b}_{MLE} is an unbiased estimator, that is, $E[\hat{b}_{MLE}] = b$
 - C. The standard error of \hat{b}_{MLE} involves σ^2 , the variance of e_i
 - D. All of the above
39. Which of the following is NOT the reason that we have a t test for $H_0: b = 0$ in simple linear regression?
- A. The result \hat{b}_{MLE} has a normal distribution is used to obtain $z \sim N(0, 1)$
 - B. The $\hat{\sigma}_{MLE}^2$ is proportional to χ^2 distribution
 - C. A t distribution can be obtained as a ratio of $z \sim N(0, 1)$ over $\sqrt{V/r}$, where V has χ^2 distribution with degree of freedom $(r - 1)$
 - D. All of the above are correct reasons
40. Which of the following is the most correct value for the standard error of b ?
- A. $n\hat{\sigma}_{MLE} / ((n - 1) \sum_{i=1}^n (x_i - \bar{x})^2)$
 - B. $\sqrt{n\hat{\sigma}_{MLE} / ((n - 2) \sum_{i=1}^n (x_i - \bar{x})^2)}$
 - C. $n\hat{\sigma}_{MLE} / ((n - 2) \sum_{i=1}^n (x_i - \bar{x})^2)$
 - D. $\sqrt{n\hat{\sigma}_{MLE}^2 / ((n - 2) \sum_{i=1}^n (x_i - \bar{x})^2)}$

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【財管系碩士班甲組】

—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。
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- 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。

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科目名稱：微積分【財管系碩士班甲組】

題號：443003

※本科目依簡章規定「不可以」使用計算機(問答申論題)

共 2 頁第 1 頁

For each question, clearly show all derivation steps and explicitly state the calculus rules, identities, or formulas used. Answers without sufficient justification may not receive full credit.

Q1. Please calculate the following limit: (10 points)

$$\lim_{x \rightarrow 0^+} x^{\tan x}$$

Q2. Please calculate the following limit: (10 points)

$$\lim_{y \rightarrow 0} (\sqrt{y^4 + y^2 + 4} - \sqrt{y^4 + y^2})$$

Q3. Please solve the following question: (10 points)

$$\int_0^1 \int_{\sqrt{s}}^{\sqrt{1+s}} \frac{X}{\int_0^1 (\sqrt{1+t} - \sqrt{t}) dt} dy ds$$

Q4. Please solve the following question: (10 points)

$$\int_0^1 \int_0^x \frac{Z}{\int_0^1 \int_0^t e^s ds dt} e^y dy dx$$

Q5. Please evaluate the following integral. (10 points)

$$\int_0^x \cos(x) \left[\cos\left(\frac{x}{2}\right) \right]^2 dx - \frac{1}{4}x$$

Q6. Please solve the following question: (10 points)

$$\int \frac{2 \sin x \cos x}{\cos^2 x - \sin^2 x} dx$$

Q7. Please solve the following question: (10 points)

Given a bond with the following characteristics:

- Bond price: $P = 96$; Modified duration: $D = 4$; Convexity: $C = 24$

Recall that a second-order Taylor expansion of a function $f(x)$ around $x = 0$ is given by:

$$f(x) \approx f(0) + f'(0)x + \frac{1}{2}f''(0)x^2.$$

Consider two possible policy scenarios announced by the Federal Open Market Committee (FOMC):

- Scenario A (Rate cut): the interest rate decreases by 50 basis points.
- Scenario B (Rate hike): the interest rate increases by 50 basis points.

(1) Using a first-order Taylor expansion, estimate the bond price under each scenario. (4 points)

(2) Using a second-order Taylor expansion, write down the approximation formula to re-estimate the bond price under each scenario. Briefly explain why the second-order term leads to different effects under a rate cut versus a rate hike. (6 points)

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【財管系碩士班甲組】

題號：443003

※本科目依簡章規定「不可以」使用計算機(問答申論題)

共 2 頁 第 2 頁

Q8. Please solve the following differential equation: (10 points)

$$y' + y = xy^2$$

Q9: Please solve the following question: (10 points)

Due to recent political instability in a major oil-producing country, the daily profit (in million USD) of a representative oil-exporting firm becomes uncertain.

Let x denote the daily oil price fluctuation index, where $0 \leq x \leq 2$.

The profit function of the firm is given by

$$\pi(x) = 20 - 4x^2.$$

Assume that x is uniformly distributed on $[0, 2]$.

(1) Please compute the expected daily profit of the firm. (5 points)

(2) Please briefly interpret the economic meaning of your result. (5 points)

Q10. Please solve the following question: (10 points)

Consider a representative listed stock whose one-period return (in percentage points) depends on a market sentiment variable x , where $0 \leq x \leq 1$.

Suppose the conditional expected return of the stock is given by

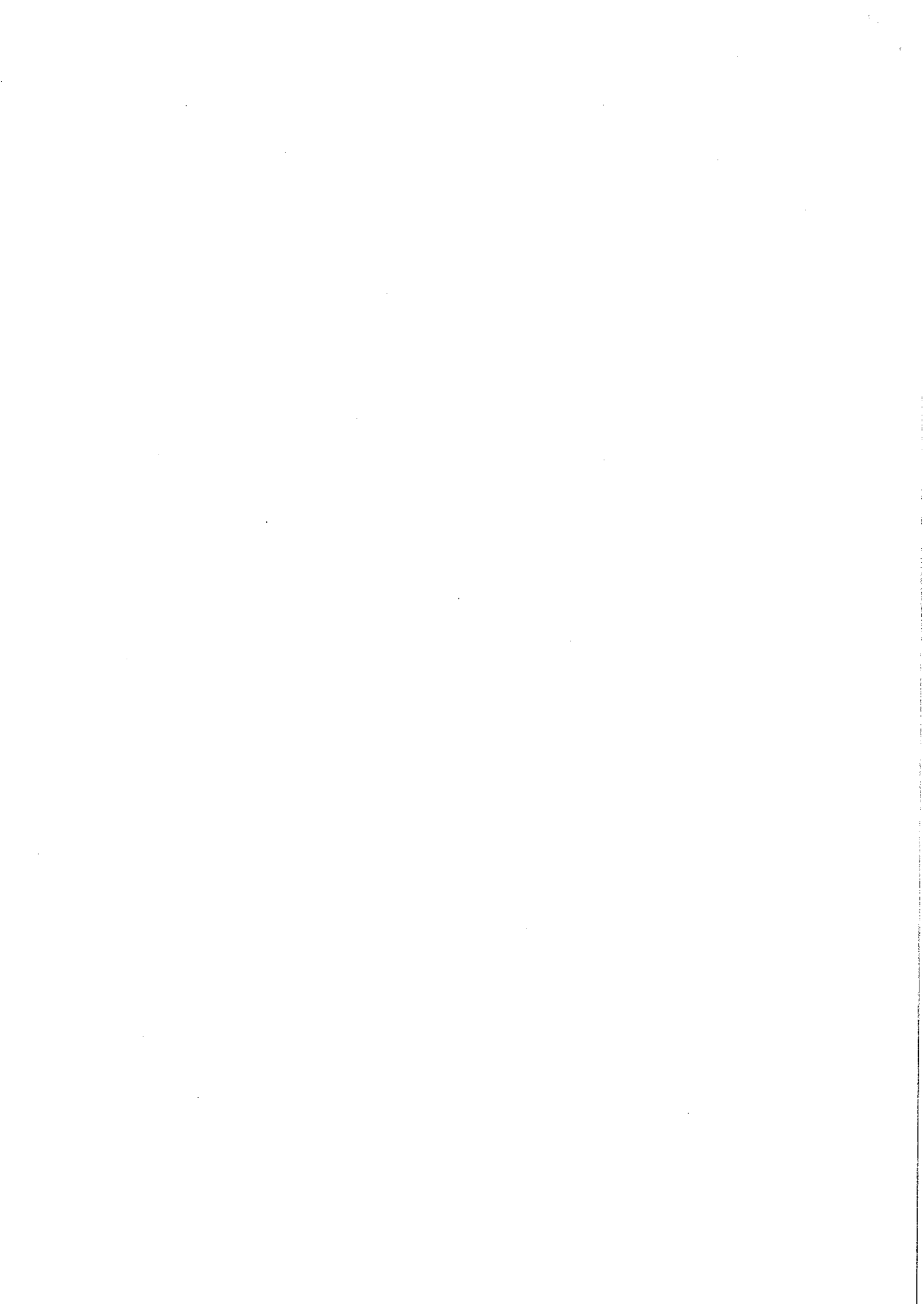
$$E(R | x) = 20 - 4x^2.$$

However, market sentiment x itself is uncertain and follows the density function

$$f(x) = 2x, 0 \leq x \leq 1.$$

(1) Compute the unconditional expected return of the stock. (6 points)

(2) Briefly explain why the unconditional expected return differs from $E(R | x = 0)$. (4 points)



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【財管系碩士班乙組】

—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，請斟酌作答。
- 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：經濟學【財管系碩士班乙組】

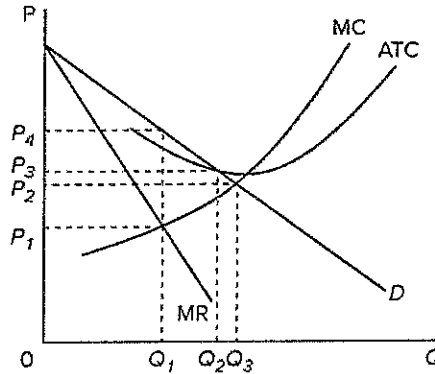
題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

共 9 頁第 1 頁

壹、單選題，每題 2 分，總分 80 分

- 1) Look at the diagram showing a pure monopoly. Which of the following pricing models would allow the monopolist to earn positive economic profits?



- A) profit-maximizing price only B) both profit-maximizing price and fair-return prices C) both fair-return price and the socially optimal prices D) all three: profit-maximizing, fair return, and socially optimal prices
- 2) Which one of the following statements is *incorrect*?
- A) Different economic models help us see how government and central bank policies can have different effects in the short run (when prices don't change much) compared to the long run (when prices can adjust freely). B) We use different macroeconomic models because the economy acts differently depending on how much time has gone by since a demand shock hit. C) Using the same model to study the different stages in a process gives us much better insight than using different models for the short run and long run. D) The economy behaves differently over time because prices are totally stuck right after a shock, but become fully flexible in the long run.
- 3) Which of the following combinations is plausible, as it relates to a nation's balance of payments?
- A) Current account = +\$30 billion; capital account = -\$20 billion; financial account = -\$10 billion. B) Current account = +\$10 billion; capital account = +\$40 billion; financial account = +\$50 billion. C) Current account = +\$50 billion; capital account = -\$20 billion; financial account = +\$30 billion. D) Current account = +\$40 billion; capital account = -\$10 billion; financial account = -\$50 billion.
- 4) Looking at the diagram showing a non-collusive oligopolist. We assume that the firm is initially in equilibrium at point E, where the equilibrium price and quantity are P and Q. If the firm's rivals will match any price increase but ignore any price reduction, the firm's marginal revenue curve will be (reading from left to right)

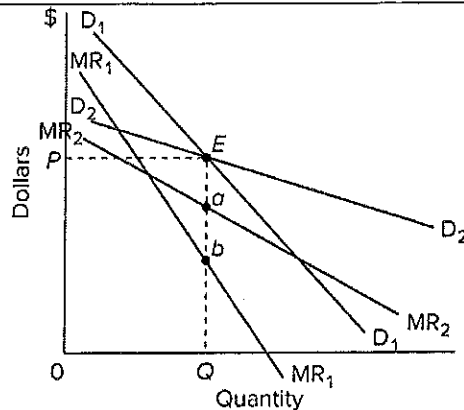
國立中山大學 115 學年度碩士班考試入學招生考試試題

科目名稱：經濟學【財管系碩士班乙組】

題號：443004

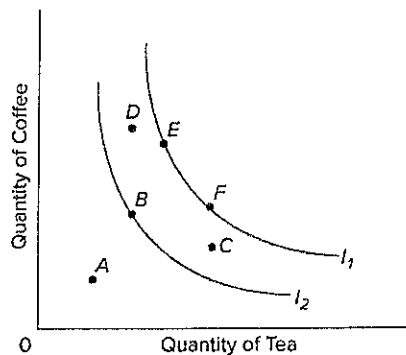
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共 9 頁第 2 頁



- A) MR_1bMR_1 . B) MR_2abMR_1 . C) MR_2aMR_2 . D) MR_1baMR_2 .

- 5) The graph shows part of a consumer's indifference map for units of coffee and tea, where I_1 and I_2 represent indifference curves. Suppose this consumer's budget line passes through points B and C. Based on this information, what can we conclude about what combination this consumer will choose?



- A) The consumer is indifferent between points B and C, and could therefore choose either one. B) This consumer will be unable to maximize their utility, regardless of which combination they choose. C) The consumer will choose point E or F. D) The actual consumption point is uncertain, but combination C would be preferred to point B.

- 6) The basic argument for income inequality is that

- A) the rich buy luxury goods that soon become affordable to everyone else because of economies of scale. B) inequality undermines incentives and tends to reduce the size of the national income. C) income inequality is essential to maintain incentives to produce. D) the very rich establish consumption patterns that are desirable for the rest of society to emulate.

- 7) A city uses 30 megawatts of electricity during off-peak hours and 50 megawatts during peak times. Up until now, the city has been buying power from an outside company, but it has decided to build its own power plants to cover all of its electricity needs. The city can build one or more plants, choosing from three options: coal, natural gas, or hydroelectric. The costs for each type are shown in the table.

Assuming the city's electricity demand stays the same for the foreseeable future, what combination of plants should it build to minimize the total cost of generating power?

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【財管系碩士班乙組】

題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

共 9 頁第 3 頁

Energy Source	Maximum Capacity (per plant)	Cost of Building Power Plant (in millions)	Operating Cost at One-Half Capacity (per kwh)	Operating Cost at Full Capacity (per kwh)
Coal	30 Megawatts	\$ 50	\$ 0.20	\$ 0.05
Natural Gas	20 Megawatts	\$ 30	\$ 0.30	\$ 0.15
Hydroelectric	10 Megawatts	\$ 15	\$ 0.50	\$ 0.20

A) two coal-fired plants. B) two natural gas plants and one hydroelectric plant. C) one coal-fired and two hydroelectric plants. D) one coal-fired plant and one natural gas plant.

8) Amanda buys a ruby for \$200 for which she was willing to pay \$340. The minimum acceptable price to the seller, Tony, was \$190. Amanda experiences

A) a consumer surplus of \$140 and Tony experiences a producer surplus of \$10. B) a consumer surplus of \$540 and Tony experiences a producer surplus of \$200. C) a producer surplus of \$140 and Tony experiences a consumer surplus of \$190. D) a consumer surplus of \$140 and Tony experiences a consumer surplus of \$150. E) a producer surplus of \$200 and Tony experiences a consumer surplus of \$140.

9) Guaranteed contracts for professional athletes may reduce the quality of their performance. This statement reflects

A) moral hazard. B) a positive externality. C) personal information. D) a negative externality.

10) In comparing a tariff and an import quota, we find that

A) the quota generates revenue for the U.S. Treasury, but the tariff does not. B) the tariff generates revenue for the U.S. Treasury, but the quota does not. C) neither the tariff nor the quota generates revenue for the U.S. Treasury. D) the tariff and quota both generate the same amount of revenue for the U.S. Treasury.

11) Suppose that salsa manufacturers sell 4 million bottles at \$5 in one year and 3 million bottles at \$4.50 in the next year. Based on this information, we can conclude that the

A) quantity demanded must have decreased. B) quantity supplied must have increased. C) demand for salsa must have decreased. D) demand for salsa must have increased.

12) A profit-maximizing firm operates in purely competitive product and resource markets, with the resource and production schedules shown in the table.

Workers	Total Production
8	440
7	410
6	370
5	320
4	260
3	180
2	110
1	55

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【財管系碩士班乙組】

題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

共 9 頁第 4 頁

- The product price is \$10 per unit and the cost per worker is \$540. How many workers will the firm employ?
A) 6 B) 4 C) 5 D) 7
- 13) Which of the following statements about the federal funds market since the 2007–2009 financial crisis is accurate?
A) The federal funds market is a highly constrained and aggressively managed market. B) The federal funds market is a competitive market in which supply and demand determine an equilibrium price. C) Federal funds market participants include banks and thrifts, branches of foreign banks, savings and loan organizations, securities firms, and agencies of the federal government. D) All of the above are accurate statements.
- 14) Suppose that a monopolistically competitive firm is currently selling 300 units of output at a price of \$200 per unit. At 300 units of output, the firm's marginal revenue is \$120, its marginal cost is \$90, and its average total cost is \$105. Based on this information,
A) the monopolist is incurring economic losses that could be reduced by lowering price and increasing output. B) the monopolist is earning economic profits that could be increased by raising price and reducing output. C) the monopolist is earning economic profits that could be increased by lowering price and increasing output. D) the monopolist is incurring economic losses that could be reduced by raising price and reducing output.
- 15) At the beginning of the year, one developing country (DVC) has a real income per capita of \$4,220. In a developed country (IAC), the real income per capita is \$14,000. Both countries experience a 5 percent growth rate for the year. At the end of the year, the absolute income gap between these two countries will have increased from \$9,780 to
A) \$4,431. B) \$14,700. C) \$10,269. D) \$9,780.
- 16) The marginal utility of the last unit of movie downloads consumed is 80, and the marginal utility of the last unit of music downloads consumed is 10. What set of prices for movie downloads and music downloads, respectively, would be consistent with consumer equilibrium?
A) \$8 and \$64 B) \$15 and \$20 C) \$20 and \$15 D) \$64 and \$8
- 17) If the economy is operating in the relatively steep (upper) portion of its aggregate supply curve, a reduction in the money supply will
A) reduce the interest rate and increase the price level. B) reduce the interest rate and increase employment. C) increase the interest rate and reduce the price level, assuming it is flexible downward. D) increase the interest rate and increase employment.
- 18) If a monopolist can perfectly price discriminate—charging every customer their maximum willingness to pay—then which of the following is true?
A) $P = MC$ for all units sold. B) The firm will necessarily minimize its production costs. C) Marginal cost must equal average total cost for all units sold. D) $P = MR$ for all units sold.

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【財管系碩士班乙組】

題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

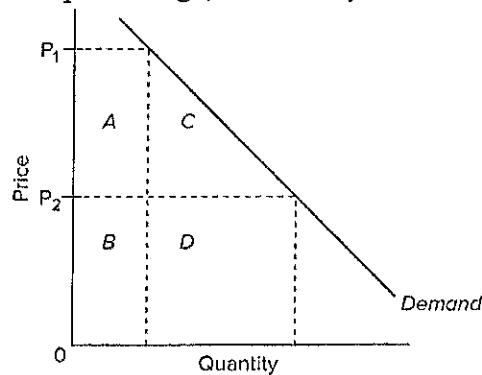
共 9 頁第 5 頁

19) Answer the question based on the payoff matrix for a duopoly in which the numbers indicate the profit in millions of dollars for each firm. Assume that firm B adopts a high-price strategy; firm A maintains a low-price strategy. Compared to the results from a high-price strategy for both firms, firm B will now

		Firm A	
		High Price	Low Price
Firm B	High Price	A = \$250 B = \$250	A = \$325 B = \$200
	Low Price	A = \$200 B = \$325	A = \$175 B = \$175

- A) gain \$75 million in profit and firm A will lose \$75 million in profit. B) lose \$25 million in profit and firm A will gain \$150 million in profit. C) gain \$75 million in profit and firm A will lose \$50 million in profit. D) lose \$50 million in profit and firm A will lose \$75 million in profit.

20) Refer to the diagram. In the P_1 to P_2 price range, we can say



- A) that consumer purchases are relatively insensitive to price changes. B) nothing concerning price elasticity of demand. C) that demand is inelastic with respect to price. D) that demand is elastic with respect to price.

21) Assume that a 3 percent increase in income across the economy produces a 1 percent decline in the quantity demanded of Good X. The coefficient of income elasticity of demand for Good X is

- A) negative, and therefore X is a normal good. B) positive, and therefore X is an inferior good. C) negative, and therefore X is an inferior good. D) positive and therefore X is a normal good.

22) An economy is employing 2 units of capital, 5 units of raw materials, and 8 units of labor to produce its total output of 640 units. Each unit of capital costs \$10; each unit of raw materials, \$4; and each unit of labor, \$3. If the per-unit price of raw materials rises from \$4 to \$8 and all else remains constant, the per-unit cost of production will rise by about

- A) 50 percent. B) 30 percent. C) 40 percent. D) 100 percent.

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【財管系碩士班乙組】

題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

共 9 頁第 6 頁

23) Marginal cost is calculated as the

- | | | | |
|--|---|---|---|
| A) total cost divided by the quantity of output. | B) change in total variable cost divided by the change in output. | C) total variable cost divided by the quantity of output. | D) change in average variable cost divided by the change in output. |
|--|---|---|---|

24) The given equations describe consumption and investment for a private closed economy.

$$C = 80 + 0.5Y$$

$$I = I_0 = 55$$

In this economy, the equilibrium level of income (Y) is

- | | | | |
|---------|---------|---------|---------|
| A) 405. | B) 270. | C) 245. | D) 135. |
|---------|---------|---------|---------|

25) What are the primary effects of cost-push inflation?

- | | | | |
|---|--|--|--|
| A) It raises real output, increases employment, and redistributes income. | B) It raises real output but redistributes a decreased level of real income. | C) It reduces real output but redistributes an increased level of real income. | D) It reduces real output, reduces employment, and redistributes income. |
|---|--|--|--|

26) Refer to the accompanying data. Disposable income is

Gross Investment	\$ 18
National Income	100
Net Exports	2
Personal Income	85
Personal Consumption Expenditures	70
Saving	5
Government Purchases	20
Net Domestic Product	105
Statistical Discrepancy	0

- | | | | |
|----------|----------|----------|----------|
| A) \$77. | B) \$75. | C) \$73. | D) \$83. |
|----------|----------|----------|----------|

27) If government uses its stabilization policies to maintain full employment under conditions of cost-push inflation,

- | | | | |
|--|--|--|------------------------------------|
| A) a deflationary spiral is likely to occur. | B) even higher inflation is likely to occur. | C) the Phillips Curve is likely to shift inward. | D) stagflation is likely to occur. |
|--|--|--|------------------------------------|

28) "Since what one industry produces often becomes the raw material for another, if just one industry failed to meet its production target under the central plan, it set off a chain reaction that hurt production across the board." This quotation best identifies the

- | | | | |
|--|--|---|---|
| A) incentive problem under central planning. | B) self-sufficiency dilemma under communism. | C) resource overcommitment problem under communism. | D) coordination problem under central planning. |
|--|--|---|---|

29) Which of the following is one of the simplifying assumptions made in constructing a production possibilities curve?

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【財管系碩士班乙組】

題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

共 9 頁第 7 頁

A) A wide variety of products are produced.	B) Resources are fully employed and are used in least-cost methods of production.	C) Quantities of available resources in the economy vary as we move from one point on the curve to another.	D) The state of technology is constantly changing.
---	---	---	--

30) If the price index rises from 100 to 120, the purchasing power value of the dollar

A) will rise by 20 percent.	B) will rise by one-sixth.	C) will fall by one-sixth.	D) may either rise or fall.
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31) A firm decides to make a \$20 million expenditure on research and development that will create a new product. This product is expected to generate a one-time increase in the firm's revenues by a total of \$40 million a year later. The firm also estimates that the production cost of the new product will be \$18 million, also realized one year after the initial R&D expenditure. What is the expected rate of return on this research and development expenditure?

A) 11.1 percent.	B) 10 percent.	C) 5 percent.	D) 20 percent.
------------------	----------------	---------------	----------------

32) A given reduction in government spending will dampen demand-pull inflation by a greater amount when the

A) unemployment rate is high.	B) economy's MPS is large.	C) economy's aggregate supply curve is flat.	D) economy's aggregate supply curve is steep.
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33) Which of the following adverse supply shocks contributed to the stagflation in the mid-1970s?

A) The U.S. Department of Agriculture making a substantial purchase of domestic agricultural products.	B) A greatly depreciated dollar.	C) A decrease in tax rates.	D) An appreciating dollar.
--	----------------------------------	-----------------------------	----------------------------

34) Other things equal, a tariff is

A) inferior to an import quota for Americans because a tariff increases the profits of domestic producers.	B) superior to an import quota for Americans because a tariff generates revenue for the U.S. Treasury.	C) inferior to an import quota for Americans because a tariff generates revenue for the U.S. Treasury.	D) superior to an import quota for Americans because a tariff increases the profits of foreign producers.
--	--	--	---

35) Refer to the table, in which the values for columns (2) through (5) are in acres. Positive land rent will occur if the relevant columns are

(1) Land Rent	(2) Quantity Supplied	(3) Quantity Demanded	(4) Quantity Demanded	(5) Quantity Demanded
\$ 400	60	40	30	10
300	60	50	40	20
200	60	60	50	30
100	60	70	60	40
0	60	80	70	50

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【財管系碩士班乙組】

題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

共 9 頁第 8 頁

- A) (1), (2), and (4) and (1), (2), and (5). B) (1), (2), and (3) and (1), (2), and (5). C) (1), (2), and (3) only. D) (1), (2), and (3) and (1), (2), and (4).
- 36) If a purely competitive constant-cost industry is realizing economic profits, we can expect industry supply to
- A) increase, output to rise, price to rise, and profits to fall. B) increase, output to fall, price to fall, and profits to fall. C) increase, output to rise, price to fall, and profits to fall. D) decrease, output to fall, price to rise, and profits to fall.
- 37) A company gives each employee a fixed budget to choose their own insurance benefits. Mary, who has five kids with dental problems, chooses the dental insurance plan. This is an example of the
- A) principal-agent problem. B) free-rider problem. C) adverse selection problem. D) moral hazard problem.
- 38) Which of the following *is not* a reason for the stability of the consumption and saving schedules?
- A) Major tax changes occur so frequently their effect on consumption and saving is mitigated. B) Consumption-saving decisions are influenced by the need to save for retirement. C) Changes in the non-income determinants of consumption and saving frequently work in opposite directions and therefore may be self-canceling. D) Consumption-saving decisions are strongly influenced by long-term considerations such as saving to meet emergencies.
- 39) The equations for the demand and supply curves for a particular product are $P = 10 - 0.4Q$ and $P = 2 + 0.4Q$, where P is price and Q is quantity expressed in units of 100. After an excise tax is imposed on the product, the supply equation is $P = 3 + 0.4Q$. The excise tax on each unit of the product
- A) is \$3. B) is \$1. C) cannot be determined with the information given. D) is \$2.
- 40) A horizontal Security Market Line would imply that investors
- A) view all financial assets as equally risky. B) greatly dislike risk and must be compensated for it. C) prefer assets with greater risk. D) are unconcerned about risk and require no additional compensation for risk.

貳、填充題，每題組 10 分，總分 20 分（中英文回答皆可，請在答案卷上作答）

Part A: Behavioral Economics (10%)

Fill in each blank with the appropriate term or concept. (2 points each)

1. According to "Prospect Theory", people feel the pain of losing \$100 more strongly than the pleasure of gaining \$100. This asymmetry is known as _____.
2. When people spend a \$1,000 bonus more freely than \$1,000 from their regular salary, even though money is fungible, they are engaging in _____.
3. The phenomenon where people value an object more highly simply because they own it is called the _____ effect.
4. When investors believe they can beat the market because they overestimate their own abilities and knowledge, they are exhibiting _____.
5. After seeing news coverage of a plane crash, people tend to overestimate the likelihood of dying in a flight. This is an example of the _____ heuristic.

試題請隨卷繳回，請留意背面是否有題

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【財管系碩士班乙組】

題號：443004

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共 9 頁第 9 頁

Part B: Public Goods and Externalities (10%)

Fill in each blank with the appropriate term or concept. (2 points each)

1. A swimming pool that charges admission but can become overcrowded during peak hours is an example of a _____ good.
2. The tendency for individuals to benefit from a public good without contributing to its cost is known as the _____ problem.
3. According to the _____ theorem, private bargaining can achieve an efficient outcome when property rights are clear and transaction costs are zero.
4. When too many fishermen catch fish from the same ocean and the fish population declines, this problem is called the _____.
5. Because people can enjoy national defense without paying for it, the private market will _____ this type of good relative to the socially optimal level.

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：財務管理【財管系碩士班丙組】

—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，請斟酌作答。
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- 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：財務管理【財管系碩士班丙組】

題號：443002

※本科目依簡章規定「不可以」使用計算機(混合題)

共 5 頁第 1 頁

一、單選題 (共六十分，第 1 題至第 20 題，每題三分)

1. A bond is issued with a 5% coupon rate and a market current yield of 7%. Which of the following statements is correct?

- (A) The bond's yield to maturity is 5%.
- (B) The bond's price at maturity is higher than its issue price.
- (C) The bond's price decreases as it approaches maturity.
- (D) The bond's price at maturity is lower than its issue price.

2. Which of the following statements about dividend policy theories is incorrect?

- (A) Modigliani and Miller (M&M) argue that dividend policy does not affect firm value, largely because shareholders can create "homemade" dividends.
- (B) M&M contend that a firm's value is determined entirely by the success of its investment decisions; therefore, it is independent of dividend policy.
- (C) Under the information-content hypothesis, a dividend cut conveys negative information about expected future earnings; hence, dividend policy matters.
- (D) The dividend clientele effect suggests that a firm's dividend policy attracts particular types of investors; that is, dividend policy arises only in response to clientele demand when higher stock prices are an incentive, and once stock prices are in equilibrium, dividend policy is again irrelevant to firm value.

3. Based on the following dividend distribution plans:

Plan	Stock Dividend	Cash Dividend
A	10%	2.5 per share
B	5%	8 per share

Assume the stock price before the ex-dividend/ex-rights date is NT\$100. Which plan results in a lower stock price after going ex-dividend and ex-rights?

- (A) Plan A
- (B) Plan B
- (C) The two plans result in the same price
- (D) Cannot be determined

4. A, B, and C are three stocks with the same expected return. Their return standard deviations are 0.35, 0.25, and 0.45, respectively. The correlation coefficients are given below:

Correlation Matrix	A	B	C
A	1.00	-0.10	-0.40
B	-0.10	1.00	-0.30
C	-0.40	-0.30	1.00

Which of the following portfolios has the lowest risk? What is the standard deviation of the minimum-risk portfolio?

- (A) Invest equally in stocks A and B
- (B) Invest equally in stocks A and C
- (C) Invest equally in stocks B and C
- (D) Invest all funds in stock C

5. Orion Technologies is currently all-equity financed (zero debt) and could issue debt at an interest rate of 6.4%. Its current WACC is 10.0%, and the corporate tax rate is 24%. If the firm changes its target capital structure to 30% debt (and 70% equity), what will be its cost of equity?

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共 5 頁第 2 頁

- (A) 11.07%
- (B) 11.17%
- (C) 11.27%
- (D) 11.37%

6. The stock price of A Inc. will be either \$65 or \$85 one year from now. One-year European call options on the stock are available. The current T-bill rate is 5%. Suppose the current stock price is \$70 and the exercise (strike) price is also \$70. What is the value of the call option today?

- (A) \$5.79
- (B) \$6.38
- (C) \$6.07
- (D) \$7.14

7. A firm has issued a 30-year callable convertible bond with a par value of \$1,000. The bond pays a 3.5% annual coupon, semiannually. Comparable nonconvertible bonds are priced to yield 5 percent, compounded semiannually. The bond's conversion price is \$48, and the current stock price is \$28. Compute (i) the conversion premium and (ii) the bond's minimum value (floor value). $1/1.025^{60} \approx 0.2276$, Which answer is correct?

- (A) Conversion premium = 71.43%; Minimum value = \$583.33
- (B) Conversion premium = 71.43%; Minimum value = \$768.28
- (C) Conversion premium = 41.67%; Minimum value = \$768.28
- (D) Conversion premium = 71.43%; Minimum value = \$795.88

8. Currently, the spot exchange rate is JPY 150.00 per USD. Forecasts indicate that the annual inflation rate is expected to be 2.8% in the United States and 1.2% in Japan. Using the inflation differential to project the exchange rate, what is the predicted exchange rate five years from now?

- (A) JPY 121.50 per USD
- (B) JPY 129.90 per USD
- (C) JPY 138.38 per USD
- (D) JPY 149.40 per USD

9. A European call option has a strike price of \$50 and expires in 12 months. The current stock price is \$95. The risk-free interest rate is 3% per year, compounded continuously. If the stock's volatility is 0% per year, what is the current value of the call option?

- (A) \$42.69
- (B) \$45.00
- (C) \$46.48
- (D) \$47.89

10. Holding all else constant, which of the following changes would increase a firm's cash cycle?

- I. The inventory period increases.
- II. The accounts receivable period increases.
- III. The accounts payable period decreases.

- (A) I only
- (B) I and II
- (C) II and III
- (D) I, II, and III

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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共 5 頁第 3 頁

11. Which of the following is the most effective defense against a hostile takeover?

- (A) A poison pill
- (B) A golden parachute
- (C) Restructuring the firm's capital structure
- (D) None of the above

12. An investment project requires an initial investment of \$3.2 million today and is expected to generate annual cash inflows of \$0.95 million for 5 years. If the annual discount rate is 4%, what is the project's net present value (NPV)?

- (A) \$1.185 million
- (B) \$1.094 million
- (C) \$1.029 million
- (D) \$0.962 million

13. A sponsor supports a project by pre-ordering the creator's future product and later receives the promised product upon delivery. Which type of crowdfunding is this?

- (A) Equity crowdfunding
- (B) Donation-based crowdfunding
- (C) Reward-based crowdfunding
- (D) Asset-based crowdfunding

14. What corporate governance problem can a pyramidal ownership structure create?

- (A) Conflicts between controlling and minority shareholders
- (B) Separation between voting and cash-flow rights
- (C) Conflicts between shareholders and management
- (D) All of the above

15. Apple Corp is evaluating two alternative capital structures. Under Plan A, the firm would have 13,000 shares outstanding and \$110,000 of debt. Under Plan B, the firm would have 10,500 shares outstanding and \$220,000 of debt. The interest rate on the debt is 9 percent. Under an all-equity plan, the firm would have 15,000 shares outstanding. What are the break-even levels of EBIT for Plan A and Plan B relative to the all-equity plan?

- (A) (74,250, 74,250)
- (B) (66,000, 74,250)
- (C) (73,500, 66,825)
- (D) (74,250, 66,000)

16. You observe the following two securities:

Security	Beta	Expected return
Bubble beta	2.32	16.80%
Roberta beta	(0.50)	9.30%

Assume both securities are correctly priced under the CAPM. Based on this information, what is the expected return on the market portfolio?

- (A) 12.74%
- (B) 13.29%
- (C) 13.88%
- (D) 14.12%

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共 5 頁第 4 頁

17. In behavioral finance, the affect heuristic is best described as:

- (A) Investors predict future returns by assuming recent performance will continue.
- (B) Investors use immediate feelings as a shortcut, which influences their perceptions of risk and expected returns.
- (C) Investors give too much weight to information that is vivid and easy to remember, even if it is not very informative.
- (D) Investors tend to believe news that supports what they already think, and pay less attention to news that goes against their view.

18. Which of the following are important indicators commonly used to assess a firm's corporate governance?

- I. Nomination committee
 - II. Shareholder election committee
 - III. Audit committee
 - IV. Supervisory board committee
 - V. Compensation committee
- (A) I, II, and III
 - (B) II, III, and IV
 - (C) I, III, and IV
 - (D) I, III, and V

19. Which statement correctly distinguishes a stock dividend from a stock split?

- (A) Both transactions require a journal entry to reclassify retained earnings into paid-in capital.
- (B) A stock split increases shares outstanding and increases total shareholders' equity by the same proportion.
- (C) A stock dividend typically requires capitalization of retained earnings, whereas a stock split generally does not require such capitalization.
- (D) A large stock dividend is recorded at the market value of the shares issued, while a small stock dividend is recorded at par value.

20. According to Taiwan's Financial Supervisory Commission (金管會) Sustainability Roadmap for listed firms, by which year must all listed firms complete a greenhouse gas (GHG) inventory, with the inventory boundary aligned with the scope of the firm's consolidated financial statements?

- (A) 2025
- (B) 2026
- (C) 2027
- (D) 2028

二、問答題 (共四十分，每題十分)

1. You want to evaluate the risk-adjusted performance of a stock (or a managed portfolio) using the Fama-French three-factor model. Briefly explain, in a step-by-step way, how you would estimate (i) Jensen's alpha and (ii) the stock's (or portfolio's) loadings on the market, size, and value factors.

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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共 5 頁第 5 頁

2. After finishing its capital expenditures for the year, Ford Manufacturing has \$2,000 of excess cash. Management must decide whether to invest the funds in Treasury bonds yielding 5%, or to distribute the cash to shareholders, who would then invest the proceeds in the same bonds.

(a) If the corporate tax rate is 33%, what personal (ordinary income) tax rate would make shareholders indifferent between receiving the dividend now and having Ford invest the cash on their behalf? (3 points)

(b) Is your answer in part (a) reasonable? Explain briefly. (1 point)

(c) Now assume Ford's only investment alternative is preferred stock yielding 5%, and the 60% corporate dividend exclusion applies. What personal tax rate would make shareholders indifferent to Ford's dividend decision? (The 60% dividend exclusion applies to Ford (a corporation), not to individual shareholders.) (3 points)

(d) Does this provide a strong case for maintaining a low dividend payout ratio? Why or why not? (3 points)

3. Show that, when corporate taxes are taken into account, the degree of operating leverage can be written as:

$$DOL = 1 + [FC \times (1 - T_C) - T_C \times D] / OCF$$

Assume there is no interest expense (i.e., ignore financing effects). Note that this expression reduces to the no-tax case when $T_C = 0$.

Note:

OCF: After-tax operating cash flow

T_C : Corporate tax rate

FC: Fixed costs (excluding depreciation)

D: Depreciation

4. Compaq Corporation is considering relaxing its current cash-only sales policy by offering customers one-period net credit terms (payment due in one period). Assume costs are paid at the time of sale. Under the new policy revenue is collected one period later.

(a) Using the information below, determine whether Compaq should adopt the new policy. Assume the required return is 4.5% per period. (5 points)

	Current policy	New policy
Price per unit	\$67	\$75
Cost per unit	\$52	\$52
Unit sales	3005	3100

(b) Based on your analysis in part (a), compute the break-even unit sales level under the proposed policy (i.e., the quantity that makes Compaq indifferent between the two policies). (5 points)

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【財管系碩士班甲組】

—作答注意事項—

考試時間：100 分鐘

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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【財管系碩士班甲組】

題號：443003

※本科目依簡章規定「不可以」使用計算機(問答申論題)

共 2 頁第 1 頁

For each question, clearly show all derivation steps and explicitly state the calculus rules, identities, or formulas used. Answers without sufficient justification may not receive full credit.

Q1. Please calculate the following limit: (10 points)

$$\lim_{x \rightarrow 0^+} x^{\tan x}$$

Q2. Please calculate the following limit: (10 points)

$$\lim_{y \rightarrow 0} (\sqrt{y^4 + y^2 + 4} - \sqrt{y^4 + y^2})$$

Q3. Please solve the following question: (10 points)

$$\int_0^1 \int_{\sqrt{s}}^{\sqrt{1+s}} \frac{X}{\int_0^1 (\sqrt{1+t} - \sqrt{t}) dt} dy ds$$

Q4. Please solve the following question: (10 points)

$$\int_0^1 \int_0^x \frac{Z}{\int_0^1 \int_0^t e^s ds dt} e^y dy dx$$

Q5. Please evaluate the following integral. (10 points)

$$\int_0^x \cos(x) \left[\cos\left(\frac{x}{2}\right) \right]^2 dx - \frac{1}{4}x$$

Q6. Please solve the following question: (10 points)

$$\int \frac{2 \sin x \cos x}{\cos^2 x - \sin^2 x} dx$$

Q7. Please solve the following question: (10 points)

Given a bond with the following characteristics:

- Bond price: $P = 96$; Modified duration: $D = 4$; Convexity: $C = 24$

Recall that a second-order Taylor expansion of a function $f(x)$ around $x = 0$ is given by:

$$f(x) \approx f(0) + f'(0)x + \frac{1}{2}f''(0)x^2.$$

Consider two possible policy scenarios announced by the Federal Open Market Committee (FOMC):

- Scenario A (Rate cut): the interest rate decreases by 50 basis points.
- Scenario B (Rate hike): the interest rate increases by 50 basis points.

(1) Using a first-order Taylor expansion, estimate the bond price under each scenario. (4 points)

(2) Using a second-order Taylor expansion, write down the approximation formula to re-estimate the bond price under each scenario. Briefly explain why the second-order term leads to different effects under a rate cut versus a rate hike. (6 points)

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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共 2 頁第 2 頁

Q8. Please solve the following differential equation: (10 points)

$$y' + y = xy^2$$

Q9: Please solve the following question: (10 points)

Due to recent political instability in a major oil-producing country, the daily profit (in million USD) of a representative oil-exporting firm becomes uncertain.

Let x denote the daily oil price fluctuation index, where $0 \leq x \leq 2$.

The profit function of the firm is given by

$$\pi(x) = 20 - 4x^2.$$

Assume that x is uniformly distributed on $[0, 2]$.

- (1) Please compute the expected daily profit of the firm. (5 points)
- (2) Please briefly interpret the economic meaning of your result. (5 points)

Q10. Please solve the following question: (10 points)

Consider a representative listed stock whose one-period return (in percentage points) depends on a market sentiment variable x , where $0 \leq x \leq 1$.

Suppose the conditional expected return of the stock is given by

$$E(R | x) = 20 - 4x^2.$$

However, market sentiment x itself is uncertain and follows the density function

$$f(x) = 2x, 0 \leq x \leq 1.$$

- (1) Compute the unconditional expected return of the stock. (6 points)
- (2) Briefly explain why the unconditional expected return differs from $E(R | x = 0)$. (4 points)

