

考 試 科 目	經濟學	系 所 別	商學院共同科	考 試 時 間	2 月 18 日 (一) 第一節
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一、Multiple Choice (1 point each)

Identify the letter of the choice that best completes the statement or answers the question.

- One would expect to observe diminishing marginal product of labor when
 - workers are discouraged about the lack of help from other workers.
 - crowded office space reduces the productivity of new workers.
 - union workers are told to reduce their work effort in preparation for a new round of collective bargaining talks.
 - only new workers are trained in using the most productive capital.
- Comparing marginal revenue to marginal cost
 - reveals the contribution of the last unit of production to total profit.
 - is helpful in making profit maximization production decisions.
 - always reveals whether a firm is making an economic profit.
 - tells a firm whether its fixed costs are too high.
 - (i) and (ii) only
 - (iii) only
 - (ii) and (iii) only
 - All of the above are correct.
- The monopolist's profit-maximizing quantity of output is determined by the intersection of which of the following two curves?
 - marginal cost and demand
 - average cost and demand
 - marginal cost and marginal revenue
 - average cost and marginal revenue
- One key difference between an oligopoly market and a competitive market is that
 - oligopolistic firms are interdependent while competitive firms are not.
 - oligopolistic firms sell completely unrelated products while competitive firms do not.
 - oligopolistic firms sell their product at a price equal to marginal cost while competitive firms do not.
 - oligopolistic firms are price takers while competitive firms are not.

備

註

- 作答於試題上者，不予計分。
- 試題請隨卷繳交。

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<p>5. When advertising encourages customers to become more informed about all firms in the market,</p> <p>A. demand curves for specific brands in the market are likely to become less elastic.</p> <p>B. each firm is likely to have less market power.</p> <p>C. firms are able to foster stronger brand loyalty.</p> <p>D. the market power of individual firms is strengthened.</p> <p>6. David faces choices between Apple and Banana. He feels that having five apples and three bananas (5,3) is not different from having four apples and six bananas (4,6). Which following statement(s) is (are) possibly correct if Ethan's indifferent curves are downward-sloping?</p> <p>(i) Ethan feels (4, 4.8) is as good as (5, 3).</p> <p>(ii) Ethan feels (6, 2) is as good as (4, 6).</p> <p>A. (i)</p> <p>B. (ii)</p> <p>C. (i) and (ii)</p> <p>D. None of the above is correct.</p> <p>7. John and Ethan both work eight hours a day. In one day, John can make 4 cakes or 8 ice cream, whereas Ethan can make 2 cakes or 5 ice cream. Given this, which statement(s) is (are) correct?</p> <p>(i) Ethan has a lower opportunity cost in producing ice cream than John.</p> <p>(ii) John has an absolute advantage in producing both goods.</p> <p>(iii) It is not beneficial for John to trade with Ethan.</p> <p>A. (i) and (ii)</p> <p>B. (i) and (iii)</p> <p>C. (ii) and (iii)</p> <p>D. (i), (ii), and (iii)</p> <p>8. Which following statement(s) is (are) correct?</p> <p>(i) A Giffen good is always an inferior good.</p> <p>(ii) A Giffen good is a good that its income effect is larger than its substitution effect.</p> <p>A. (i)</p> <p>B. (ii)</p> <p>C. (i) and (ii)</p> <p>D. None of the above is correct.</p>					
備 註	<p>一、作答於試題上者，不予計分。</p> <p>二、試題請隨卷繳交。</p>				

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9. John, Ethan, and Mary decide to buy a bike together and share the ownership. Their willingness to pay for each choice is in the following table

	John	Ethan	Mary
Bike A	\$800	\$300	\$500
Bike B	\$700	\$450	\$500
Bike C	\$600	\$500	\$500
Bike D	\$500	\$550	\$500
Bike E	\$400	\$650	\$500

They will choose the bike that all three agree to buy. Which following statement(s) is(are) correct?

- (i) The bike will be a public good among them.
(ii) If three people share the cost and all bikes have the same price, \$1500, the choice that maximizes aggregate surplus will be chosen.

- A. (i)
B. (ii)
C. (i) and (ii)
D. None of the above is correct.

10. Suppose Country A proposes to impose a tax on a good. One report from an economist argues that this tax will increase producers' before-tax total revenue and make the producers bear relatively more tax burden than consumers. Which following statement is correct for the good?

- A. The price elasticity of demand is 1.8; the price elasticity of supply is 0.8.
B. The price elasticity of demand is 0.9; the price elasticity of supply is 0.3.
C. The price elasticity of demand is 0.6; the price elasticity of supply is 1.4.
D. There is not enough information to answer the question.

11. In a certain economy, when income is \$1000, consumer spending is \$800. The value of the multiplier for this economy is 2.5. It follows that, when income is \$1060, consumer spending is

- A. \$815.
B. \$836.
C. \$900.
D. \$950.

考 試 科 目	經濟學	系 所 別	商學院共同科	考 試 時 間	2 月 18 日 (一) 第一節
<p>12. Which of the following is not a reason that paying efficiency wages may increase a firm's profit?</p> <p>A. Efficiency wages increase worker health and therefore increase worker productivity.</p> <p>B. Efficiency wages decrease worker turnover and therefore decrease hiring and training costs.</p> <p>C. Efficiency wages decrease worker shirking and therefore increase worker productivity.</p> <p>D. Efficiency wages are below the equilibrium wage rate but still attract high quality workers.</p> <p>13. If the Federal Reserve accommodates an adverse supply shock,</p> <p>A. inflation expectations may rise which shifts the short-run Phillips curve shifts right.</p> <p>B. inflation expectations may rise which shifts the short-run Phillips curve shifts left.</p> <p>C. inflation expectations may fall which shifts the short-run Phillips curve shifts right.</p> <p>D. inflation expectations may fall which shifts the short-run Phillips curve shifts left.</p> <p>14. If a local bank decides to convert some of its U.S. Treasury securities into cash, which it will hold in its vault, what impact will this have on the bank's balance sheet?</p> <p>A. Reserves would increase, liabilities would stay the same, and owner's equity would decrease.</p> <p>B. Reserves would increase, liabilities would stay the same, and owner's equity would increase.</p> <p>C. Reserves would decrease, liabilities would decrease, and owner's equity would decrease.</p> <p>D. Reserves would decrease, liabilities would stay the same, and owner's equity would decrease.</p> <p>15. Matilda just graduated from college. In order to devote all her efforts to college, she didn't hold a job. She is going to tour around the country on her motorcycle for a month before she starts looking for work. Other things the same, the unemployment rate</p> <p>A. increases, and the labor-force participation rate decreases.</p> <p>B. and the labor-force participation rate both increase.</p> <p>C. increases, and the labor-force participation rate is unaffected.</p> <p>D. and the labor-force participation rate are both unaffected.</p> <p>16. In an IS-LM model, if the government adopts a loose monetary policy and a tight fiscal policy simultaneously,</p> <p>A. interest rate increases, while output stays the same.</p> <p>B. interest rate stays the same, while output decreases.</p> <p>C. interest rate change is uncertain, while output increases.</p> <p>D. interest rate decreases, while output changes is uncertain.</p>					
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17. In a small open economy, a loose fiscal policy coupled with an increase in import tariff will cause domestic currency to

- A. increase.
- B. decrease.
- C. remain the same.
- D. change in an uncertain direction.

18. Assuming, in a two-period model, that the nominal wage rate increases from \$10/hour to \$15/hour; the expected price level increases from 1 to 3; and the actual price level increases from 4 to 5, we can deduce that

- A. nominal wage rate decreases.
- B. expected real wage rate increases.
- C. actual real wage rate increases.
- D. All of the above are correct.

19. Suppose the objective function of a government is described by $W(u, \pi) = (u + 5\pi^2)$ where u is the unemployment rate, and π is the inflation rate, while the Phillips curve is described by $\pi = \pi^e - 2(u - u^*)$ where π^e is the expected inflation rate, and u^* is the natural rate of unemployment. Which of the following inflation rate is a credible promise that the government can make?

- A. 0%
- B. 2%
- C. 5%
- D. 10%

20. If the central bank announces a decrease in money supply while keeping the actual money supply unchanged, the rational expectations theory would predict

- A. both output and price remain unchanged.
- B. output increases, while price decreases.
- C. output decreases, while price increases.
- D. output remains unchanged, while price decreases.

備

註

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二、Problems and Short-essay Questions

Please answer the following questions IN SEQUENCE. All questions may be answered in either Chinese or English.

1. Suppose there is a small country. It imports apples at the price of \$10 per bag. The demand curve is $D = 400 - 10P$. The supply curve is $S = 50 + 5P$. The country imposes a specific tariff so that the import is 50 bags. Answer the following questions.

- (5 points) Calculate the tariff imposed by the country.
- (5 points) Calculate the tariff revenue.
- (5 points) Calculate the consumption distortion loss.
- (5 points) Calculate the production distortion loss.

2. Suppose the demand curve of a specific kind of flower for Country A is $Q^D = 200 - P$, where Q^D is the quantity demanded and P is the price. The supply curve in the same market is $Q^S = 3P$, where Q^S is the quantity supplied.

A. (15 points) Suppose scientists find that the scent of this specific kind of flower can cure mental disorders. Hence, for each unit of the quantity demanded brings \$80 external benefit. Assume the world price P^W is \$60 and is not affected by Country A's policies. Considering this external benefit, should Country A export or import how many units of this good? Please draw a graph and label all relevant points. Also, please show your calculation.

B. (5 points) How can the government deal with the issue of the external benefit that is described above? Please clearly explain your answer.

3. In an imaginary economy, consumers buy only sandwiches and magazines. In 2016, the base year, a sandwich cost \$5 and a magazine cost \$4. The consumers bought 20 sandwiches and 25 magazines at these prices. In 2017, a sandwich cost \$6.

A. (8 points) If the consumer price index in 2017 was 125, then how much did a magazine cost in 2017?

B. (12 points) Suppose that consumers bought 30 sandwiches and 25 magazines in 2017. What was the growth rate of nominal GDP between 2016 and 2017? What was the growth rate of real GDP between 2016 and 2017? What was the GDP deflator in 2017?

備

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4. Consider an economy with a consumption function $C = C_0 + c \cdot Y_d$, where Y_d represents disposable income; an investment function $I = I_0 - b \cdot r$, where r represents interest rate; tax revenue $T = T_0 + t \cdot Y$, where t represents tax rate; transfer payment TP ; a money demand function $L = k \cdot Y - h \cdot r$; a money supply function, $M = M_0/P$, where M_0 is the nominal money supply controlled by the central bank, and P represents the general price level.

A. (10 points) Derive the equilibrium output level Y^* when the goods market and the money market are in equilibrium simultaneously.

B. (10 points) Discuss how Y^* is related to nominal money supply, and how this relationship is affected by h .



備

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考 試 科 目	保險法	系 所 別	風管系, 法律組 - 一般生	考試時間	2 月 18 日(一) 第一節
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申論題：(每題二十五分)

一、於 2019 年 1 月，主管機關公布保險法部分修正草案，其中對於保險法第 16 條之修正，草案說明如下：「對於為因應社會環境之轉變及保險實務需要，增訂要保人對於配偶、直系血親之生命或身體有保險利益，以及團體保險不適用之規定。」上述修正有無缺失？試論述之。

二、小張於 2018/7/1 購買超跑汽車一輛，為有效管理汽車駕駛之責任風險，分別向 A、B 兩家產險公司購買一張任意汽車責任保險，保險金額均為「合併單一限額」(combined single limit, CGL)200 萬元。後來因各界關切「超跑汽車責任」之賠償議題，小張又於 2019/1/1 向 C 產險公司購買「汽車超額責任保險」，保險金額為 CGL 1000 萬元。試問：

(一) 小張之行為，有無構成保險法所稱之「複保險」？

(二) 若小張發生車禍而有肇責，其應負責額度有以下 3 種情況：100 萬元、300 萬元、500 萬元。保險公司應如何理賠？

三、人身保險有無「損失填補原則」之適用？若保險商品採取「定額給付」保險金方式，無違反上述原則？試論述之。

四、何謂「除斥期間」？何謂「消滅時效」？試依照現行保險法之規定，舉例說明「除斥期間」與「消滅時效」之差異。

備

註

- 一、作答於試題上者，不予計分。
- 二、試題請隨卷繳交。

考 試 科 目	民法（總則與債編總論）	系 所 別	風險管理與保險學系/法律組	考 試 時 間	2 月 18 日(一) 第三節
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一、甲為 A 保險經紀人公司之業務員，因知悉年約 60 歲的乙事業有成，開始擔心將來遺產被課徵高額稅捐，便向乙遊說投保人壽保險來節稅。乙極為心動，便經由甲與 A 公司向 B 保險公司投保保險金額為三千萬元之儲蓄型人壽保險，一次付清全部保險費二千萬元，並指定受益人為獨生女丙。不料乙投保後甫經半年，即因意外事故身亡。丙所受領的保險金，仍然被國稅局課徵遺產稅 180 萬元，並加罰同額的漏稅罰鍰。丙認為甲的保險規劃並無原來聲稱的節稅效果，便依侵權行為與債務不履行之規定，訴請甲、A 公司與 B 公司連帶賠償其應補繳之稅額與罰鍰。被告均認為甲的規劃並無錯誤，是國稅局不當課稅；且丙應循訴願與行政訴訟救濟主張權利，不應向被告求償。請附理由說明：何者之主張較有理由？（30 分）

二、甲於 2018 年 5 月 6 日上午，與 A 電信公司訂立每月 1399 元，綁約 24 個月的電信資費方案，可享行動網路吃到飽，網內通話免費，網外通話 180 分鐘內免費的電信服務。但在同年 5 月 8 日晚間，A 電信公司推出「綁約 30 個月，每月新台幣 499 元行動網路吃到飽」的促銷方案（以下簡稱「499 方案」），為期僅一週（可申辦日期為 2018 年 5 月 9 日至 5 月 15 日，共 7 天）。因為此一方案與原方案及其他同業提供的價格差距頗大，甲甚為不滿，認為 A 電信公司隱匿新資費方案，有欺騙消費者之虞。但甲計算之後，覺得支付違約金改辦新方案仍然比較划算，只好支付新台幣 8 千元的違約金申辦之。但事後甲越想越氣，一週之後，甲主張 A 公司收取的違約金過高，起訴請求法院酌減違約金，並同時要求返還之；備位請求與違約金同額的損害賠償。A 公司拒絕之。請附理由說明：何者之主張較有理由。（40 分）

三、甲獨資經營服飾店，但因為欠缺管空成本的能力，導致虧損連連，分別積欠乙、丙各達 100 萬元、200 萬元的貨款未償。後甲已無力清償債務，決定結束營業，將全部庫存服飾打折出清，得款 90 萬元，全部用以清償丙的債權。乙得知之後，認為甲對丙的清償並不公平，損害乙的利益，便以甲丙為被告，訴請撤銷甲丙間的清償行為。甲丙均抗辯：甲對丙的清償同時減少甲的債務，並未改變甲的總財產狀態，不符合撤銷要件。請附理由說明：何方的主張較有理由？（30 分）

備

註

- 一、作答於試題上者，不予計分。
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考 試 科 目	統計學	系 所 別	風險管理與保險學系管理組	考 試 時 間	2 月 18 日(一) 第 3 節
<p>1. What are the classical regression assumptions? (20%)</p> <p>2. What does a p-value mean? Show your understanding of a p-value. (10%)</p> <p>3. Assume X follows an exponential distribution with a mean $\frac{1}{t}$. This function can be described as follows:</p> $f_X(x) = te^{-tx}, 0 < x < \infty$ <p>What is the expected value of X given $X > 1$? (10%)</p> <p>4. Do you agree the following statement: "correlation implies causation"? Please clearly specify your reasons. (10%)</p> <p>5. Suppose a data set contains 8 observations as follows 7.26, 7.27, 7.24, 7.29, 7.28, 7.25, 7.23 and 7.32. Please test whether the mean of these observations is equal to 7.25 under a statistical significance level of 0.05. ($t_{7, 0.025} = 2.365$; $t_{7, 0.010} = 2.998$; $t_{8, 0.025} = 2.306$; $t_{8, 0.010} = 2.896$) (10%)</p> <p>6. Compare and contrast interval scale and ratio scale. (10%)</p> <p>7. Assume X and Y follow a joint distribution below:</p> $f(x, y) = \begin{cases} = t, & 0 \leq x \leq 3, 0 \leq y \leq 1, 2y \leq x \\ = 0, & \text{otherwise} \end{cases}$ <p>(1) Find t. (10%)</p> <p>(2) Find the marginal probability function of Y. (10%)</p> <p>(3) Find the conditional probability of Y given $X = x$. (10%)</p>					
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考試科目	微積分	系所別	風險管理與保險學系 精算科學組	考試時間	2月18日(一)第一節
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Problem 1 (8 points) Evaluate the integral

$$\int_{-1}^1 \frac{e^{2x}}{1+e^x} dx.$$

Problem 2 (8 points) Evaluate the improper integral

$$\int_0^{\infty} x^n e^{-x} dx,$$

n is a positive integer.

Problem 3 (10 points) Find

$$\lim_{n \rightarrow -\infty} \left(1 + \frac{1}{x}\right)^x.$$

Problem 4 (10 points) Find

$$\lim_{n \rightarrow \infty} \left(\frac{1}{n+1} + \frac{1}{n+2} + \cdots + \frac{1}{n+n} \right).$$

Problem 5 (14 points) Consider the cardioid given by $r = 1 - \cos\theta$, $0 \leq \theta \leq 2\pi$.

- (a) Find the area enclosed by this curve.
- (b) Find the length of this curve.

Problem 6 (10 points) Find

$$\int_0^1 \int_{\sqrt{x}}^1 \sin(y^3) dy dx.$$

Problem 7 (16 points) Determine whether the series converges absolutely, or converges conditionally, or diverges.

(a)

$$\sum_{n=1}^{\infty} (-1)^n \frac{3 \cdot 5 \cdot 7 \cdots (2n+1)}{n! \cdot 3^n}.$$

(b)

$$\sum_{n=1}^{\infty} \ln\left(1 + \frac{1}{\sqrt{n}}\right).$$

Problem 8 (10 points) Let

$$f(x) = \sin(x^3).$$

Find

$$f^{(15)}(0).$$

Problem 9 (14 points) Use the method of Lagrange multipliers to find the extreme values of z on the curve of intersection of

$$x^2 + z^2 = 1$$

and

$$y^2 + z^2 + z = 1.$$

考 試 科 目	統計學	系 所 別	風險管理與保險學系/精算科學組	考 試 時 間	2 月 18 日(一) 第 3 節
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假設 $\Phi(\cdot)$ 是標準常態分配的累計分配函數. 所以 $\Phi(1) = 0.8413$ ($\Phi^{-1}(0.8413) = 1$) 和 $\Phi(2) = 0.9772$ ($\Phi^{-1}(0.9772) = 2$). $\pi = 3.14159$. \log 是自然對數函數

1. (30%) 假設 Z 是標準常態隨機變數, $U = \Phi(Z)$, $X = -2 \log(\Phi(Z))$, $W = Z^2$
 - a. 請證明 U 為均勻隨機變數, 並計算 U 的期望值與變異數。
 - b. 請證明 X 為指數隨機變數, 並計算 X 的期望值與變異數。
 - c. 請證明 W 為卡方隨機變數, 並計算 W 的期望值與變異數。
2. (40%) 令 $A = \int_0^1 h(x) dx$, 其中 $h(\cdot)$ 為任意函數. $g(\cdot)$ 是定義在 $[0, 1]$ 上的密度函數. X_1, \dots, X_n 是從 g 抽樣出來的獨立樣本.

$$\hat{A} = \frac{1}{n} \sum_{i=1}^n \frac{h(X_i)}{g(X_i)}$$

- a. 請證明 $E[\hat{A}] = A$. 亦即 \hat{A} 是 A 的不偏估計.
 - b. 假設 $h(x) = e^{-\frac{x^2}{2}}$, 請計算 A .
 - c. 假設 $h(x) = e^{-\frac{x^2}{2}}$, $g(x) = \frac{c}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}, x \in [0, 1]$. 請計算常數 c , 使得 $g(\cdot)$ 是定義在 $[0, 1]$ 上的密度函數.
 - d. 假設 X_1, \dots, X_n 是從上式 c. $g(x) = \frac{c}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$ 抽樣出來的獨立樣本. 請問 n 要取多大才能讓 \hat{A} 的標準誤小於 0.01?
3. (30%) $X = (X_1, X_2, X_3)$ 為多元常態隨機向量. 其共變異數矩陣為

$$\Sigma = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 2 \\ 1 & 2 & 3 \end{pmatrix}$$

共變矩陣的特徵值與特徵向量分別為

考 試 科 目	統計學	系 所 別	風險管理與保險學系/精算科學組	考 試 時 間	2 月 18 日(一) 第 3 節
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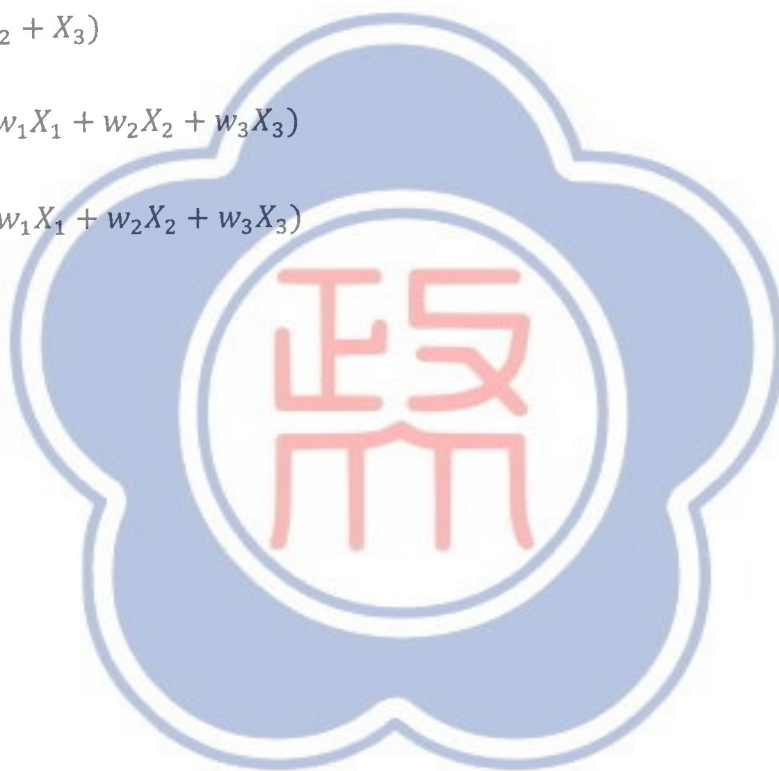
$$\lambda_1 = 5.0489, q_1 = (0.328, 0.591, 0.737)^T;$$

$$\lambda_2 = 0.6431, q_2 = (0.737, 0.328, -0.591)^T;$$

$$\lambda_3 = 0.308, q_3 = (0.591, -0.737, 0.328)^T;$$

$w = (w_1, w_2, w_3)$ 是單位向量 (亦即 $w_1^2 + w_2^2 + w_3^2 = 1$)

- 計算 $\text{Var}(X_1 + X_2 + X_3)$
- 求解 $\max_w \text{Var}(w_1 X_1 + w_2 X_2 + w_3 X_3)$
- 求解 $\min_w \text{Var}(w_1 X_1 + w_2 X_2 + w_3 X_3)$



備

註

- 一、作答於試題上者，不予計分。
- 二、試題請隨卷繳交。