考試科目	經濟學	系所別	商學院共同科	考試時間	2月3日(五)第二節

I、Multiple Choice (1 point each)

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

1. John has an income of $\$m$ per week. He consumes only two commodities, x and y. Let p_x be the price of x and p_y be the price of y. If he consumes more than $\bar{X}$ units of x per week, he can use coupons to buy the next Z units of x at a price of $p_x(1-s)$. If he buys more than $\bar{X}+Z$, he has to pay the full price p_x for additional units. His weekly income is greater than $p_x[\bar{X}+(1-s)Z]$. The maximum amount of x that he can buy per week is

A. $\bar{X}+\frac{mZ}{p_x}$.
B. $\frac{m+\bar{X}}{p_x}+Z$.
C. $\frac{m}{p_x}+sZ$.
D. $Z-\frac{(m+p_x)}{1-s}p_x$.

2. Professor Lin gives 3 midterm exams. Only the highest one counts. You are taking his course and have a 60 on your first exam. Let x_2 be your score on the second exam and x_3 be your score on the third exam. If you draw your indifference curves for scores on the second and third exams with x_2 represented by the horizontal axis and x_3 represented by the vertical axis, then your indifference curve through the point $(x_2, x_3) = (50, 70)$ is

A. ㄱ-shaped with a kink where $x_2 = x_3$.
B. three line segments, one vertical, one horizontal, and one running from $(70, 60)$ to $(60, 70)$.
C. a straight line, running from $(0, 70)$ to $(70, 0)$.
D. an L-shaped curve with its point at $(50, 70)$.

3. Consider the utility function to be $\min\{x, yz\}$. The price of x is \$1, the price of y is \$4, and the price of z is \$4. Henri's income is \$20. How many units of x does Henri demand?

A. 5
B. 20/9
C. 2
D. 3

4. Suppose that the production function is $f(x_1, x_2) = (x_1^a + x_2^a)^b + c$, where a, b, and c are positive constants. For what values of a, b, and c does the firm have constant returns to scale?

A. For any values of a if $b < 1$ and $c = 0$.
B. For any values of a and c if $ab < 1$.
C. For any values of a and c if $ab = 1$.
D. For any value of c if $a < 1$ and $b < 1$.

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	經濟學	系所別	商學院共同科	考試時間	2月3日(五)第二節

5. Roommate 1's utility function is $3X_1 + G$ and Roommate 2's utility function is X_2G, where G is their expenditures on the public goods they share in their apartment and where X_1 and X_2 are their respective private consumption expenditures. The total amount they have to spend on private goods and public goods is \$30,000. They agree on a Pareto optimal pattern of expenditures in which the amount that is spent on Roommates 1's private consumption is \$5,000. How much do they spend on public goods?

A. \$1,000
B. \$15,000
C. \$7,999
D. \$18,000

6. Consider a monopolistically competitive market in an economy moves from autarky to free trade. Which of the following statements is (are) correct?
(i) The domestic demand curve for a domestic firm will shift to the right.
(ii) The price elasticity of domestic demand that a domestic firm faces will increase in the absolute value.
(iii) The domestic firm's markup will decrease.

A. Only (i)
B. (i) and (ii)
C. (ii) and (iii)
D. (i) and (iii)

7. Which of the following curves is not affected by the existence of diminishing marginal product of input factors?

A. The average fixed cost curve.
B. The average variable cost curve.
C. The marginal cost curve.
D. The variable cost curve.

8. Suppose the shutdown point of a firm in a perfectly competitive market is that the market price is \$10. At the shutdown point, the average total cost of the firm is \$20. What is the average fixed cost?

A. 5
B. 10
C. 15
D. Need more information.

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	經濟學	系所別	商學院共同科	考試時間	2月3日(五)第二節

9. The information in the table below shows the total demand for gasoline in a small urban market. Assume that each gasoline provider pays a fixed cost of $100,000 (per year) to operate in the market area and that the marginal cost of providing the gasoline to a household is zero.

Quantity	Quantity (per year)
0	120
3000	90
4000	80
5000	70
6000	60
7000	40
8000	30

Assume any agreement between two firms are not enforceable and two firms compete in quantity. What is the market price under the Nash equilibrium according to the table?

A. 80
B. 70
C. 60
D. 40

10. In a monopolistically competitive market, if the long run marginal cost curve intersects the long run marginal revenue cost curve and long run average cost curve when the marginal cost is $10 and $20 respectively, which of the following choices is a possible long run equilibrium market price?

A. 5
B. 10
C. 15
D. 21

11. How would a decrease in the frictional unemployment affect the long-run Phillips curve?

A. It would shift the long-run Phillips curve right.
B. It would shift the long-run Phillips curve left.
C. There would be an upward movement along a given long-run Phillips curve.
D. There would be a downward movement along a given long-run Philips curve.

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	經濟學	系所別	商學院共同科	考試時間	2月3日(五)第二節

12. In the Unites States, the CPI was 80 in 1980 and is 300 today, then $100 today purchases the same amount of goods and services as
A. $26.67 purchased in 1980.
B. $33.33 purchased in 1980.
C. $40.00 purchased in 1980.
D. $80.00 purchased in 1980.

13. If total spending rises from one year to the next, then which of the following could not be true?
A. the economy is producing a smaller output of goods and services, and goods and services are selling at higher prices.
B. the economy is producing a larger output of goods and services, and goods and services are selling at lower prices.
C. the economy is producing a larger output of goods and services, and goods and services are selling at higher prices.
D. the economy is producing a smaller output of goods and services, and goods and services are selling at lower prices.

14. You put money into an account that earns a 3 percent real interest rate. The inflation rate is 2 percent, and the tax rate on your interest income is 20 percent. What is your after-tax real rate of interest?
A. 2.0 percent.
B. 2.4 percent.
C. 3.0 percent.
D. 3.6 percent.

15. Time inconsistency will cause the
A. short-run Phillips curve to be higher than otherwise.
B. short-run Phillips curve to be lower the otherwise.
C. long-run Phillips curve to be farther to the right than otherwise.
D. long-run Phillips curve to be farther left than otherwise.

16. Which of the following policies should be used to close an inflationary GDP gap?
A. A decrease in government purchases.
B. An increases in taxes.
C. A decrease in money supply.
D. All of the above.

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	經濟學	系所別	商學院共同科	考試時間	2月3日(五)第二節

17. If a country has a current account balance of -$120 and a capital and financial account balance of $80, there will be _____ in official reserves of _____ .

A. an increase; $40.
B. an increase; $200
C. a decrease; $40
D. a decrease; $200

18. When the central bank in a country decreases the money supply, its

A. price level rises and its currency appreciates relative to other currencies in the world.
B. price level falls and its currency appreciates relative to other currencies in the world.
C. price level falls and its currency depreciates relative to other currencies in the world.
D. price level rises and its currency depreciates relative to other currencies in the world.

19. The Ricardo-Barro effect states that government deficits

A. increase the equilibrium real interest rate, crowding out investment.
B. decrease private saving, the equilibrium real interest rate and investment.
C. increase private saving and have no effect on the equilibrium real interest rate and investment.
D. decrease the equilibrium real interest rate and increase investment.

20. Suppose potential GDP exceeds real GDP in a short-run macroeconomic equilibrium. If aggregate demand does not change, then the

A. short-run aggregate supply curve will shift rightward as the money wage rate decreases.
B. short-run aggregate supply curve will shift leftward as the money wage rate increases.
C. long-run aggregate supply curve will shift leftward as the money wage rate increases.
D. long-run aggregate supply curve will shift leftward as the money wage rate decreases.

Ⅱ. Problems and Short-essay Questions

1. Consider the following utility function.

$$u(x_1, x_2) = \begin{cases} 3x_1 + x_2 & \text{if } x_1 > 2x_2, \\ \frac{7}{5}x_1 + \frac{21}{5}x_2 & \text{otherwise.} \end{cases}$$

A. (7 points) Calculate the marginal rate of substitution.

B. (6 points) (9,1) and (c,6) sit on the same indifference curve. What is the value of c?

C. (7 points) Let m stand for the consumer's income. Please calculate the demand function as a function of p_1, p_2, and m.

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	經濟學	系所別	商學院共同科	考試時間	2月3日(五)第二節

2. Suppose Firm A is the only seller of Product A in a closed economy. The firm faces the following demand, marginal revenue, and marginal cost curves.

$$\text{Demand: } P = 70 - Q$$
$$\text{Marginal Revenue: } MR = 70 - 2Q$$
$$\text{Marginal Cost: } MC = 10 + Q$$
$$\text{Total cost: } TC = 210 + 10Q + 0.5Q^2$$

A. (4 points) Please calculate the efficient loss due to the monopoly.

Suppose the government of the economy decides to open the market to the world. The world price of Product A is \$30.

B. (4 points) How many units of Product A will the economy export or import in the short run?

C. (4 points) How many units of Product A will the economy export or import in the long run?

D. (8 points) In the long run, if the government wants to maintain that both the domestic producer and foreign importers coexist in the domestic market, the government should tax or subsidize the importers? What is the minimum value of the per-unit tax or the per-unit subsidy to achieve this goal?

3. Consider an economy where the representative consumer has a utility function $U = CF$ over clothing C and food F, and has an income of \$40.

A. (8 points) Suppose in year one (the base year), the prices of clothing and food are $p_C^1 = 2$ and $p_F^1 = 2$, respectively. What is the consumer's optimal consumption bundle? How much utility does the consumer receive from this bundle?

B. (6 points) Suppose in year two, the prices of clothing and food become $p_C^2 = 2.5$ and $p_F^2 = 10$, and the consumer's income increases in proportion to the consumer price index (CPI). What is the consumer's optimal consumption bundle?

C. (6 points) What is the minimum income in year two that enables the consumer to achieve the same level of utility as in year one? How much does the CPI overstate actual inflation due to the *substitution bias*?

4. In an economy, autonomous consumption expenditure is \$100 billion, investment is \$300 billion, and government expenditure is \$150 billion. The marginal propensity to consume is 0.90 and net taxes are \$150 billion. Exports are \$450 billion and imports are \$550 billion. Assume that net taxes and imports are autonomous and the price level is fixed.

A. (5 points) What is the value of consumption multiplier?

B. (10 points) Calculate the equilibrium aggregate expenditure.

C. (5 points) If government expenditure increases by \$200 million, what is the change in the economy's equilibrium real GDP?

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

國立政治大學　112　學年度 碩士班暨碩士在職專班 招生考試試題

考試科目	保險法	系所別	風管所法律組	考試時間	2 月 3 日（五）第 2 節

1. A 自出生雙側腎臟大小就顯然不同，但腎功能仍在正常標準範圍。其後與 B 交往，A 曾對 B 表示身體壯如牛，結婚生子沒有問題。2015 年 A 自覺身體狀況不佳，赴醫院看診，主訴：幻覺、倦怠、提不起精神、嗜睡、無法集中精神等。經診斷後發現有橫紋肌溶解導致急性腎衰竭之狀況，經治療後腎功能幸運恢復。A 與 B 於 2016 年結婚，B 並以自己為要保人，為 A 向 C 保險公司投保人壽保險（保單 1）、醫療（保單 2）與失能保險（保單 3），死亡部分並以 B 為受益人。憑藉與 A 聊天之記憶，B 就要保書之詢問事項，包含 A 是否有任何心理先天疾病、腎臟是否有先天或功能異常、相關病史等，均勾選為「無」。之後兩人關係轉淡，經常爭吵，2017 年 5 月兩人離婚。A 於 2018 再次因幻覺、無法集中注意等情形送醫，仔細檢查後方發現有思覺失調症。B 回頭照顧 A，經多次治療，A 狀況逐漸提升。2018 年兩人情感也逐漸回溫，雖然沒有再次結婚，但兩人回復同居，並決定以後共同生活。2019 年，A 與 B 因車禍受困車內，A 雖提早脫困，但為了救 B，重新衝回現場救出 A，但 A 因嚴重灼傷導致左手截肢。2020 年，A 因幻覺復發，自殺身亡。在上述歷程中，保單 1、保單 2、保單 3 之效力如何？被保險人或受益人可否請求理賠？（25%）

2. A 有一車，曾向 B 保險公司投保責任險 200 萬，又向 C 保險公司投保責任險 500 萬。某日 A 因駕駛不慎，失控撞擊 D 駕駛之價值 600 萬之名車，造成全損。D 之汽車曾向 E 保險公司投保車體險，約定保額 400 萬，自負額為 200 萬。請依據保險法與相關學理，分析上述保險法律關係。如 A 與 D 有夙怨，A 是故意撞擊 D 之汽車，且 A 本身資力僅有 100 萬元，則保險法律關係為何？（25%）

3、甲於民國 105 年 5 月間，以自己為被保險人，向 A 人壽保險公司（下稱 A 公司）投保人壽保險，約定保險費為年繳，保險金額為新臺幣五百萬元，甲並指定其配偶乙為受益人。110 年 5 月間，甲失業又罹患大腸癌，無力繳交保險費，經保險公司催告且未於寬限期間內補繳保險費，契約效力於 110 年 6 月 25 日停止。同年 9 月間，友人丙知悉上情，便提議由丙出資予甲補繳保險費、利息及其他費用共計八萬元，向 A 公司申請復效，但甲應增加指定丙為受益人，受益權比例為保險金額的五分之一。甲同意並依約向 A 公司申請復效及增加指定丙為受益人後，於 111 年 3 月即因癌症惡化而死亡。乙、丙向 A 公司請求給付保險金時，A 公司拒絕之，並主張丙代繳保費使甲申請復效並被指定為受益人，形同以甲之生命為投資標的，違反公序良俗，故保險契約無效。乙、丙則主張契約之訂立與復效均符合法律規定，保險人自應給付保險金。請附理由說明：A 公司是否應給付保險金予乙、丙。（25%）

4、甲以自己為被保險人，向 A 人壽保險公司投保人壽保險，約定保險金額為 600 萬元，受益人欄位則填寫「法定繼承人」。訂約時，甲之家庭成員包含配偶乙以及獨子丙。訂約後，甲、乙因感情不睦而離婚，半年後甲與丁結婚，逾一年後再生一女戊。再過一年，甲因車禍死亡，丙依法辦理拋棄繼承。請附理由說明：乙、丙、丁、戊等四人，何人有權請求 A 公司給付保險金？其得請求之金額各為多少？（25%）

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

國立政治大學　112　學年度 碩士班暨碩士在職專班 招生考試試題

考試科目	公司法	系所別	風管所法律組	考試時間	2 月 3 日(五) 第 4 節

1. 何謂經營判斷法則(Business Judgement Rule)？試論述其意義、要件、運作方式，以及對我國法之啟示。(25%)

2. 設 A 產物保險公司因販售防疫保險而受巨大損失，為紓解財務危機，董事 B 乃提案董事會決議，欲以低於行情價格緊急變賣公司之某廠房，並以高於行情之年利率 18%向銀行借款新台幣 2500 萬元。會議中董事 C 曾發言表示反對，但最後仍決議通過。請依我國公司法，分析上述法律關係。假設前述決議違反法令或章程，則另一位董事 D、監察人 E、以及持有 0.5%股份比例之股東 F，依公司法有何種權利可以主張？（25%）

3. A 公司以鋼鐵業起家，近年投資以運輸為主業之 B 公司，投資金額約達 A 公司總資產之兩成。受疫情影響，B 公司之運輸業務後勢看漲，2022 年之獲利已達 A 公司全年度獲利之六成。C 公司對 A 公司覬覦已久，近年持續買進股份，從 2022 年 9 月持股已達 51%迄今。依據現行公司法，C 公司有何方式得以儘速取得 A 公司之經營權？又 A 公司知悉 C 之主要目標為 B 公司，在經董事會討論 2 兩小時候，就決定出售所持有之 B 公司股權。因疫情導致 B 股價上漲，故此次處分仍使 A 公司或有相當利益。試問 A 公司出售 B 公司股權之方式是否妥適？C 應如何回應為妥？（25%）

4. A 為 B 公司之發起人，經多年經營後收入頗豐，後於 2020 年退休，仍持有公司約 3 成之股份，且除了榮譽顧問以外並無任何職位。近期公司因疫情承受鉅額虧損，A 乃召集董事長 B、總經理 C、董事 D 開會並予以斥責，要求變更經營方向，結果導致公司虧損加遽。A 並以自己名義召開股東會，以普通決議將公司之廠房轉租於 D 為董事之 E 公司，並將另一空地轉售予以自然人 F。試依據公司法與相關法理，分析上述事實。(25%)

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

國立政治大學　112　學年度 碩士班暨碩士在職專班 招生考試試題

考試科目	保險學	系所別	風險管理與保險學系保險法律組	考試時間	2 月 3 日(五)第四節

一、名詞解釋:請就下列 10 個名詞說明其含義。40%

1. Coinsurance clause
2. Endorsements and riders
3. Facultative reinsurance
4. Grace period
5. Irrevocable beneficiary
6. Maximum possible loss
7. Rebating
8. Subrogation
9. Accelerated death benefits
10. Estoppel

二、請就我國產險公司及壽險公司所銷售之各項防疫相關商品，分析其商品設計之異同，並以此角度分析說明產壽險經營上的差異。20%

三、我國高齡化與少子化問題非常嚴重，請問保險公司面對這個問題，在商品面與資金運用面上可以有哪些因應方案?20%

四、請問保險公司承保的可保風險(insurable risk)通常具有那些特質?請問戰爭風險以及交通事故風險是否符合這些特質?20%

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

國立政治大學　112　學年度 碩士班暨碩士在職專班 招生考試試題

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 3 日(五) 第 4 節

1. Assume that 30% of the population is hypertensive. An automated blood-pressure testing device is used to examine the prevalence of hypertension. Suppose that 80% of hypertensives and 20% of normotensives are classified as hypertensive by this device. What is the predictive value positive (also known as "precision") of the device? (15%)

2. Two players join in a coin-flipping game. They take turns in flipping a coin. The probability that the coin will come up heads is t. The first player to obtain a head is the winner. Suppose that we are interested in the probability that the first player to flip is the winner. This probability is referred to be as $f(t)$.

   (a) Find the value of $\lim_{t\to 1} f(t)$. (10%)

   (b) Find $f(t)$. (15%)

3. Alex is playing a gambling game where he draws a card from a 52-card playing deck. He will be paid 15 dollars for drawing a king or an ace and 5 dollars for drawing a jack or a queen. He will have to pay 4 dollars if he draws any other card. What is the expected value of his gain from this game? (15%)

4. The length of time required by patients to complete a one-hour medical test is a random variable with a density function as follows.

   $f(t) = at^2 + t, 0 \le t \le 1; 0, otherwise$

   Find a. (10%)

5. (a) What is a random variable? (5%)
   (b) What is a random sample? (5%)
   (c) What is a confidence interval? (5%)

6. Show your understanding of key classical assumptions of ordinary least squares linear regression. (20%)

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	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3日 (五) 第二節

Problem 1 (30 points) (10 % each)

Evaluate the integral

(a)

$$\int \frac{xdx}{\sqrt{8-2x^2-x^4}}.$$

(b)

$$\int_1^2 \frac{x^2+4}{x^4+3x^3+2x^2}dx.$$

(c)

$$\int_0^\infty x^2e^{-x}dx.$$

Problem 2 (15 points)

Find the interval of x such that the power series

$$\sum_{k=1}^{\infty} \frac{x^k}{ln(k+1)}$$

converges.

Problem 3 (40 points)

Evaluate the limits. (10 % each)

(a)

$$\lim_{x\to 0} \frac{\int_0^{x^2} \frac{t}{\sqrt{1+t^3}}dt}{x^4}.$$

(b)

$$\lim_{x\to 0^+} (e^x-1)^{\frac{1}{lnx}}.$$

(c)

$$\lim_{x\to -\infty} (1+\frac{1}{x})^x.$$

(d)

$$\lim_{n\to\infty} (\frac{1}{n+1}+\frac{1}{n+2}+\ldots+\frac{1}{n+n}).$$

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	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3日 (五) 第二節

Problem 4 (15 points)

(a) Given an $\epsilon - \delta$ approach to show that

$$\lim_{x \to a} f(x) = L,$$

implies

$$\lim_{x \to a} |f(x)| = |L|.$$

(b) Show that the reserved direction of the above statement is not true.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

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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3日 (五) 第4節

1. (10pts) The likelihood of the economy improving, remaining stable, or declining is

State of the Economy	Probability
improving	0.3
remaining stable	0.5
declining	0.2

The stock prices for Company A and Company B will experience the following changes:

State of the Economy	Company A	Company B
improving	Increase 18%	Increase 15%
remaining stable	Increase 8%	Increase 7%
declining	decrease 13%	decrease 6%

Fill in the blank for the following statements about the percentage price changes for Company A and Company B.

(a) (5pts) _____ Which company has the larger mean of the percentage change? Company A, Company B, or Both have same mean.

(b) (5pts) _____ Which company has the larger variance of the percentage change? Company A, Company B, or Both have same mean.

2. (5pts) If losses follow an exponential distribution with a mean of 1 and two independent losses are observed, the probability that either of the losses is more than twice the other is _____ (Fill in the blank).

3. (10pts) Let $X_1, X_2, \cdots, X_n$ be a random sample from distributions with probability density functions $f(x;\theta) = e^{-(x-\theta)}, \theta \leq x < \infty, -\infty < \theta < \infty$, 0 elsewhere. Find the maximum likelihood estimator of θ.

4. (20 pts) Please explain the following items.

   (a) (10 pts) The Central Limit Theorem

   (b) (10 pts) Prior and Posterior distribution

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	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3日 (五) 第4節

5. (10 pts) For a one-year term life insurance policy of 1000:

   (i) The premium is 30.

   (ii) The probability of death during the year is 0.02.

   (iii) The company has expenses of 2.

   (iv) If the insured survives to the end of the year, the company pays a dividend of 3.

   Ignore interest. Calculate the variance in the amount of profit the company makes on this policy.

6. (15 pts) The number of losses on a homeowner's policy is binomially distributed with parameters m = 5 and q. q varies by policyholder uniformly between 0 and 0.4. Calculate the probability of 2 or more losses for a policyholder.

7. (15 pts) Demonstrate that the probability density function for a normally distributed random variable has inflection points at $x = \mu \pm \sigma$

8. (15 pts) Let $Y_1 < Y_2 < \cdots < Y_n$ be the order stsatistics of a random sample of size n from the exponential function $f(x) = e^{-x}$ $0 < x < \infty$

   (a) (10 pts) Prove that $Z_1 = nY_1$, $Z_2 = (n-1)(Y_2 - Y_1)$, $Z_3 = (n-2)(Y_3 - Y_2)$, $\cdots$, $Z_n = Y_n - Y_{n-1}$ are independent random variables and each Z_i are also from exponential distribution.

   (b) (5 pts) Prove that the general linear function $\sum_{i=1}^{n} a_i Y_i$, where a_i are some coefficients, can be expressed into a linear function of independent random variables.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。