

考 試 科 目	經濟學	系 所 別	商學院共同科	考 試 時 間	2 月 7 日 (五) 第二節
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Multiple Choice (1 point each)

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

1. Suppose Ethan increases his working hours when obtaining higher hourly pay. Which of the following statement(s) is (are) correct?

- (i) Leisure could be an inferior good to Ethan.
- (ii) Leisure could be a normal good to Ethan.
- (iii) Leisure could be a Giffen good to Ethan.

- A. (i) and (iii)
- B. (ii)
- C. (i) and (ii)
- D. (i), (ii), and (iii)

2. Which of the following statement(s) is (are) correct when a government imposes tax on a good?

- (i) When supply is perfectly inelastic, imposing tax on consumers creates zero deadweight loss.
- (ii) When demand is perfectly elastic, imposing tax makes the market price of the good unchanged.
- (iii) When supply is perfectly elastic, and demand is perfect inelastic, imposing tax makes the market equilibrium quantity unchanged.

- A. (i) and (iii)
- B. (ii)
- C. (i) and (ii)
- D. (i), (ii), and (iii)

3. Which of the following statement(s) is(are) correct?

- (i) A monopoly firm can increase its revenue by raising the price when demand is perfectly inelastic.
- (ii) When marginal cost is zero and demand is linear, a monopolistic competitive firm will produce at the midpoint of the demand curve.
- (iii) A perfect competitive firm produces at the point that price elasticity of demand equals one.

- A. (i) and (iii)
- B. (ii)
- C. (i) and (ii)
- D. (i), (ii), and (iii)

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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4. Assume Ethan's preference on two goods, X and Y , follows typical assumptions in Economics. His budget constraint is $2X + 4Y = 20$, and his optimal consumption bundle is $(2, 4)$. Which of the following consumption bundles is possible to give the same utility level to Ethan as $(2, 4)$?

- A. $(3, 7)$
- B. $(5, 2.5)$
- C. $(0.5, 4)$
- D. $(1, 7)$

5. Town A has only three residents. They are deciding whether to spend \$ 450 to provide a public good. The public good will only be provided when all of three residents agree to do it. The value of the public good to each resident is:

Resident A	Resident B	Resident C
i	ii	iii

What is a possible bundle of (i, ii, iii) that this public good will be provided?

- A. $(0, 0, 460)$
- B. $(100, 150, 130)$
- C. $(120, 150, 160)$
- D. $(140, 140, 140)$

6. When marginal cost exceeds average total cost,

- A. average fixed cost must be falling.
- B. average fixed cost must be rising.
- C. average total cost must be rising.
- D. average total cost is falling.

7. If a firm in a competitive market increases production and its marginal revenue remains positive, raising production will

- A. be profitable.
- B. cause the firm to incur losses.
- C. leave profit unchanged.
- D. It is impossible to tell from the information provided.

備

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8. When a natural monopoly exists, it is
- always more cost effective for two or more private firms to produce the product.
 - never more cost effective for two or more private firms to produce the product.
 - always more cost effective for government owned firms to produce the product.
 - never more cost effective for one firm to produce the product.
9. If identical products are sold by firms participating in a market, the market is
- perfectly competitive.
 - an oligopoly.
 - monopolistically competitive.
- (i) or (ii)
 - (ii) or (iii)
 - (i) or (iii)
 - (i) only
10. A profit-maximizing firm in a monopolistically competitive market is characterized by which of the following?
- Revenue is always maximized along with profit.
 - Average revenue exceeds marginal revenue.
 - Marginal revenue exceeds average revenue.
 - Average revenue is equal to marginal revenue.
11. Every year more and more purchases are made with credit cards on the Internet. Given this trend, all else equal, we would expect:
- the money demand curve to shift outward.
 - the money demand curve to shift inward.
 - a downward movement along a fixed money demand curve.
 - an upward movement along a fixed money demand curve.
12. As a result of a decrease in the value of the dollar in relation to other currencies, American imports decrease and exports increase. Consequently, there is a(n):
- increase in short-run aggregate supply.
 - decrease in the quantity of aggregate output supplied in the short run.
 - increase in aggregate demand.
 - decrease in the quantity of aggregate output demanded.

備

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13. The money demand curve is:

- A. downward-sloping because the opportunity cost of holding money is inversely related to the interest rate.
- B. downward-sloping because the opportunity cost of holding money rises as the interest rate rises.
- C. downward-sloping because the opportunity cost of holding money rises as the interest rate falls.
- D. upward-sloping because the opportunity cost of holding money rises with the interest rate.

14. An example of the frictionally unemployed is a(n):

- A. autoworker who is temporarily laid off because of a decline in sales.
- B. geologist who is permanently laid off from an oil company due to a new technological advance.
- C. worker at a fast-food restaurant who quits work and attends college.
- D. real estate agent who leaves a job in Texas and searches for a similar, higher paying job in California.

15. Suppose that in year 1 an economy produces 100 baseballs that sell for \$3 each and 75 pizzas that sell for \$8 each. The next year the economy produces 110 baseballs that sell for \$3.25 each and 80 pizzas that sell for \$9 each. Using year 1 as the base year, the growth rate of real GDP from year 1 to Year 2 is:

- A. 10%.
- B. 7.8%.
- C. 19.7%.
- D. 8.8%.

16. Suppose the economy is in long-run equilibrium. Concerns about pollution cause the government to significantly restrict the production of electricity. At the same time, taxes fall. In the short-run

- A. real GDP will rise, and the price level might rise, fall, or stay the same.
- B. real GDP will fall, and the price level might rise, fall, or stay the same.
- C. the price level will rise, and real GDP might rise, fall, or stay the same.
- D. the price level will fall, and real GDP might rise, fall, or stay the same.

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17. Critics of stabilization policy argue that A. "animal spirits" must be offset by active monetary policy. B. active monetary policy is necessary for steady economic growth. C. the lag problem ends up being a cause of economic fluctuations. D. active fiscal policy is required for steady economic growth. 18. Which of the following contains a list only of things that decrease when the budget deficit of the U.S. increases? A. U.S. net exports, U.S. domestic investment, U.S. net capital outflow B. U.S. supply of loanable funds, U.S. interest rates, U.S. domestic investment C. U.S. imports, U.S. interest rates, the real exchange rate of the dollar D. U.S. interest rates, the real exchange rate of the dollar, U.S. domestic investment 19. If purchasing power parity holds, then if the price of a basket of goods in the U.S. rose from \$1,000 to \$1,200 and the price of the same basket in Poland rose from 6,400 Polish zloty to 8,000 zloty, then A. the nominal exchange rate would be unchanged and the real exchange rate would appreciate. B. the U.S. dollar would appreciate and the real exchange rate would stay the same. C. the nominal exchange rate would be unchanged and the real exchange rate would depreciate. D. the U.S. dollar would depreciate and the real exchange rate would be unchanged. 20. Imagine the U.S. economy is in long-run equilibrium. Then suppose the value of the U.S. dollar decreases. At the same time, people in the U.S. revise their expectations so that the expected price level rises. We would expect that in the short-run A. real GDP will rise and the price level might rise, fall, or stay the same. B. real GDP will fall and the price level might rise, fall, or stay the same. C. the price level will rise, and real GDP might rise, fall, or stay the same. D. the price level will fall, and real GDP might rise, fall, or stay the same.					
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考試科目	經濟學	系所別	商學院共同科	考試時間	2 月 7 日 (五) 第二節
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Problems and Short-essay Questions

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

1. Assume a government imposes a tax on the market of good A. The total tax revenue is \$500, and the quantity demanded is 100. Further, the demand is linear and has a slope of $-\frac{1}{5}$. The supply equation is $Q^S = 2P$.

A. (4 points) What is the price that consumers pay after the tax?

B. (4 points) What is the demand equation?

C. (4 points) What is the size of the deadweight loss of the taxation?

D. (4 points) What is the tax burden of consumers?

E. (4 points) Additionally, assume the government imposes this tax to deal with externality efficiently. What is the size of the externality per output unit? Is this externality positive or negative?

2. Consider an endowment economy (an economy without production). The utility function of each consumer is $U = D_x^{1/2} D_y^{1/2}$, where D_x and D_y represent demand of x and y respectively. The endowment of x is 20 units and that of y is 30 units. Answer the following questions.

A. (5 points) Show that the utility function is homothetic.

B. (5 points) Derive the demand of x relative to y as a function of p_x/p_y where p represents price.

C. (5 points) Derive the equilibrium level of p_x/p_y .

D. (5 points) Suppose there is another economy, where consumers have the same utility function but both the endowment of x and y is 30 units. Derive the equilibrium level of p_x/p_y under free trade.

備

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3. Given the following information: bank deposits 350, currency-to-deposits ratio 0.20, required reserve ratio 0.15,

A. (15 points) solve for the monetary base level, the level of bank reserves, and the money supply level in this economy.

B. (5 points) Suppose there is a sudden rise in the currency-to-deposits ratio, from the original level of 0.2 to a new level of 0.4. If everything else remains unchanged, find the level of monetary base needed to keep money supply fixed at the same level.

4. One example of how inflation discourages saving is the tax treatment of capital gains. Suppose that someone bought a parcel of land for \$2,000 in 1980 when the price index equaled 100. In 2018, the person sold the land for \$13,000, and the price index equaled 500. The tax rate on nominal gains was 20 percent.

A. (5 points) Find the before-tax real rate of capital gains.

B. (5 points) Compute the taxes on the nominal gains in terms of 2018 prices.

C. (5 points) Compute the after-tax real value of the land in terms of 1980 prices.

D. (5 points) Find the after-tax real rate of capital gains.

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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	保險法	系 所 別	風管所法律組	考 試 時 間	2 月 7 日(五) 第二節
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問答題：(每題二十五分)

一、保險法中有關「複保險」之規定，於人身保險有無適用？於責任保險有無適用？試論述之。

二、「保證保險」與「保證」有無不同？「保證保險」之保險利益何在？保險公司能否經營「保證」業務？試論述之。

三、被保險人甲罹患有先天性心臟病，但因甲從未體檢，故未知情。經業務員之推介，甲購買乙保險公司之人壽保險，並附加醫療保險。就下列問題，試論述之。

(一) 甲因心臟病突發而緊急送醫治療，乙應否理賠？

(二) 甲因心臟病突發死亡，乙應否理賠？

四、媒體報導如下：「2013 年前嘉義水上鄉爆發的醃頭案震撼全台，兇手陳佳富為詐領 600 餘萬保險金，將親妹妹陳婉婷分屍，頭顱棄置公廁。陳佳富被判刑後，喪失保險金受益權，陳女姜姓獨子去年向 C 保險公司提告，依繼承權要求給付 300 萬元保險金，但遭 C 保險公司拒賠，遂向法院提告。後經最高法院判決，陳女在陳佳富協助下隱匿精神疾病投保，投保當下欠缺判斷表達能力，意思表示不明，契約不成立，故不用理賠，全案定讞。」

試依保險法理與相關規定，評析本案。

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	系 所 別	風險管理與保險學系 法律組	考 試 時 間	2 月 7 日(五) 第 四 節
一、甲公司欲為公司之董監事向乙保險公司投保董監事責任保險，在洽談與核保過程中，乙得知甲諸多人人事、業務與財務重要安排，並知悉甲即將高薪挖角丙公司具關鍵技術之顧問丁。在保險契約簽訂前一晚，乙公司突然以電話通知因甲公司過去損失率不佳欲提高保費，甲公司表示無法接受，遂中止簽約程序，甲公司之人員原訂之機票與飯店因取消不及而受有損失。之後，乙公司董事丁在應酬閒聊中與友人戊提及此事，戊遂向任職於丙公司之好友己透露，使丙公司立即出價挽留丁而導致挖角案破局。在三個月後的競標案中，甲公司因專業技術人員不足，導致競爭對手庚公司勝出取得標案，該案價值壹仟萬台幣。甲乃就洩露挖角計畫、機票與飯店之費用損失、以及導致失去壹仟萬元標案之損失，向乙、丁請求損害賠償。試問甲之主張是否有理？又如董監事責任保險契約有順利締結，則甲之主張是否有理？（30 分） 二、請說明消滅時效與除斥期間之意義與差異。（8 分）民法第 92 條第 1 項規定：「因被詐欺或被脅迫而為意思表示者，表意人得撤銷其意思表示。但詐欺係由第三人所為者，以相對人明知其事實或可得而知者為限，始得撤銷之。」第 93 條規定：「前條之撤銷，應於發見詐欺或脅迫終止後，一年內為之。但自意思表示後，經過十年，不得撤銷。」當要保人對保險人之書面詢問有不實說明之情形，保險人除了保險法之權利，可否再行主張前揭條文？（12 分） 三、甲近五年均委請保險經紀人乙為其家族尋覓適合之保險商品，乙深受甲之信賴並成為好友，甲更將印章放於乙之辦公室以方便辦理業務，此為乙辦公室附近商家廣為所知。2019 年 10 月某日，乙於電話中以某款儲蓄險具有極高投資報酬率，且就是因為太熱門所以即將停售，力薦立即投保。甲應允後，乙即向附近之丙保險公司為甲投保蓋章，處理完畢後於附近古玩店中，發現應具投資價值之玉石，遂以甲之名義並以其印章蓋印購買。後乙向甲請款時，甲方瞭解自己並不需要此種儲蓄險，乃主張其對「有極高投資報酬率」有所誤解，故乙代訂保險契約應為無效。且乙可向丙保險公司就銷售額度收取一定比例之佣金，為違反民法雙方代理之規定，故保險契約亦應為無效。至於代買玉石之部分，甲亦主張超越寄放印章之目的，拒絕受領及給付價金。試分析上述法律關係以及甲之主張是否有理。（30 分） 四、甲 18 歲時註冊為某大學之大一學生。開學後一個月，甲經鄰居乙授權代理，為其售出手機一部，並代送手機與代轉價金。後甲為支付學費與生活費，偽稱其為滿 20 歲之大三學生，在貓空之餐廳打工，但與老闆時有衝突。餐廳老闆得知甲實未成年後，即以此為理由主張契約無效，拒付甲之薪資。甲心情苦悶，大一下學期即與同學陷入熱戀而閃婚，不到半年又旋即離婚，此後精神狀況不甚穩定。二個月後，甲突然陷於精神錯亂，將家中之名貴古董花瓶贈與大學同班好友丙。試分析上述法律關係。（20 分）					
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考試科目	統計學	系所別	風管系 (管理組)	考試時間	2月7日(五)第4節
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- (30%) Let X be a normal random variable of mean μ and variance σ^2 .
 - Compute the moment generating function (MGF) of X
 - Compute the expected value and variance of X by MGF
 - Compute the skewness and Kurtosis of X
- (30%) Let Y be a non-negative random variable of mean μ ; X be a random variable of mean μ and variance σ^2 ; and g be a convex function. Show that
 - $P(Y > c) \leq \mu/c$ for any positive real number c
 - $P(|X - \mu| > k\sigma) \leq \frac{1}{k^2}$ for any positive real number k
 - $E(g(X)) \geq g(\mu)$
- (20%) A coin having probability 0.5 of coming up heads is successively flipped until two of the most recent three flips are heads. Let N denote the number of flips. Find $E[N]$. Note that if the first two flips are heads, then $N = 2$.
- (20%) Suppose X is a Poisson random variable with mean λ . The parameter λ is itself a random variable whose distribution is exponential with mean 0.5. Compute the probability mass function $P(X = n)$

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考試科目	微積分	系所別	數學系(數學組)	考試時間	2月7日(五)第2節
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Problem 1 (8 points)

Evaluate the improper integral

$$\int_2^{\infty} \frac{4x^3 + x - 1}{x^2(x-1)(x^2+1)}.$$

Problem 2 (8 points)Suppose $f(x)$ has a continuous second derivative $f''(x)$ for $x \in (a, b)$. Find

$$\lim_{h \rightarrow 0} \frac{f(x+2h) - 2f(x) + f(x-2h)}{h^2}.$$

Problem 3 (8 points)

Find

$$\lim_{x \rightarrow 0} \frac{\int_0^x \left(\int_1^{\cos t} \sqrt{8+u^4} du \right) dt}{x^3}.$$

Problem 4 (8 points)Evaluate the integral $\int_0^{\pi} \sec^2 x dx$.**Problem 5 (12 points)**A number a is called a fixed point of a function $f(x)$ if $f(a) = a$. Prove that if $f(x)$ is differentiable and $f'(x) \neq 1$ for all real number x , then f has at most one fixed point.**Problem 6 (12 points)**Find the area of the surface obtained by rotating $y = \sin x$, $0 \leq x \leq \pi$, about the x -axis.

備

註

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考試科目	微積分	系所別	經濟學系 數學組(組)	考試時間	2 月 7 日(五), 第 2 節
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Problem 7 (14 points)

Consider the limit

$$\lim_{x \rightarrow \infty} n^2 \sum_{k=1}^n \frac{k}{n^4 + k^4}.$$

- (a) Explain carefully why the limit exists. Express the limit as a definite integral.
 (b) Evaluate this definite integral.

Problem 8 (18 points)

- (a) Write down the Maclaurin series of $\arctan x$.
 (b) What is the interval of convergence of the above series?
 (c) Find the sum of the series

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)3^n}.$$

Problem 9 (12 points)

Determine whether the series is convergent or divergent.

(a)

$$\sum_{n=1}^{\infty} (-1)^n (e^{\frac{1}{n}} - 1).$$

(b)

$$\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^3}.$$

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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組	考 試 時 間	2 月 7 日(五) 第 4 節
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1. Suppose that T_1 and T_2 have the joint density function given by

$$f(t_1, t_2) = e^{-t_1}, \quad 0 \leq t_2 \leq t_1 < \infty$$

$$f(t_1, t_2) = 0, \quad \text{otherwise}$$

(1) Find the probability $P(T_1 < 2, T_2 > 1)$. (10%)

(2) Find the probability $P(T_1 - T_2 \geq 1)$. (10%)

2. Assume that travelers arrive at a train station at a Poisson rate t . We further assume 2 travelers arrived during the first minute.

(1) Find the probability that both arrived during the first 20 seconds. (10%)

(2) Find the probability that at least one arrived during the first 20 seconds. (10%)

3. The following questions are related to the method of maximum likelihood.

(1) What is the method of maximum likelihood? (10%)

(2) Let $T_1, T_2, \dots, T_n$ be a random sample drawn from a normal distribution with mean μ and variance σ^2 . Find the maximum likelihood estimators of mean μ and variance σ^2 . (20%)

4. (1) What is the Law of Large Numbers? (10%)

(2) What is the Central Limit Theorem? (10%)

5. Tom is a candidate for a city counselor election. He sampled 10 voters and would like to test $H_0: p = 0.5$ against the alternative hypothesis $H_a: p < 0.5$. The test statistic is T , the number of sampled voters favoring Tom. What is the probability of type I error if he selects a rejection region of $T \leq 3$? (10%)

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