

考試科目	經濟學	系所別	商學院共同科	考試時間	7月6日(三)第二節
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1 Multiple Choice (3 points each)

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

- What describes the graphical relationship between average cost and marginal cost?
 - Average cost cuts marginal cost from above, at the maximum point of marginal cost.
 - Average cost cuts marginal cost from below, at the minimum point of marginal cost.
 - Marginal cost cuts average cost from above, at the maximum point of average cost.
 - Marginal cost cuts average cost from below, at the minimum point of average cost.
- If firms pay a fixed annual fee for air pollution,
 - firms will all tend to produce the same amount of pollution.
 - firms have no incentive to cut back on the amount of pollution they generate.
 - that fee will provide firms with an incentive to cut back on the amount of pollution they generate.
 - that fee will discourage firms from developing new technology.
- Consider two commodities, A and B . Commodity A 's demand function is $Q^d = a - bP_A + \frac{1}{P_B}$, where P_X is the price for commodity $X = A, B$. Moreover, the supply of A is perfectly inelastic. Now, there is an increase in P_B . The price elasticity of demand for commodity A will
 - increase.
 - decrease.
 - remain unchanged.
 - vary according to the original equilibrium price of A .
- Consider a monopoly firm with 0 marginal costs. The market demand is linear, with a slope equal to -1 . Moreover, the quantity demanded is 100 when the price is 10. Which of the following will be the equilibrium quantity demanded in this monopoly market?
 - 40.
 - 50.
 - 55.
 - None of the above are correct.
- If a commodity is a Giffen good, how an increase in income shifts the demand curve?
 - It will shift the demand to the right.
 - It will shift the demand to the left.
 - The demand will remain unchanged.
 - It cannot be determined.

備

註

- 作答於試題上者，不予計分。
- 試題請隨卷繳交。

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6. Suppose there is a food shortage due to the war in Ukraine, and Mayor Ko proposes that the government distribute equal quantities of food to each citizen at no cost. If the citizens were forbidden to trade food, would such a distribution be Pareto optimal?

A. Yes, because each person has the same amount of food as everyone else.

B. Yes, because everyone would receive their food for free.

C. Not necessarily, as people may differ in their marginal rates of substitution between food and other goods.

D. It is impossible to determine without knowing the price of food.

7. Which of the following concepts cannot explain the negative slope of the Phillips curve?

A. Menu costs

B. Labor unions

C. Money neutrality

D. Limited information

8. Which of the following policies can shift the long run Phillips curve?

A. The central bank raises the discount rate.

B. The government cuts the public spending.

C. An appreciation of the local currency.

D. The government cuts the unemployment benefits.

9. Consider the following table:

Year	Price of Apple per unit	Price of Banana per unit
2020	2	2
2021	4	2

Assume this economy is under full employment. Further, assume a typical consumer in the economy consumes 1 unit of apple and 1 unit of banana and year 2020 is the base year. If in year 2022 consumers' expected CPI index is the same as that in year 2021 but the actual CPI is 170, the short-run output of this country will be

A. higher than the full employment output.

B. lower than the full employment output.

C. equal to the full employment output.

D. similar to the previous level.

10. Other things remaining the same, when the price of domestically-made tractors increases,

A. CPI will increase.

B. GDP deflator will increase.

C. both CPI and GDP deflator will increase.

D. both CPI and GDP deflator will keep the same.

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<p>11. If a 20 billion increase in the government spending will lead to a 10 billion drop in the private investment but a 70 billion increase in the total output. What is the marginal propensity to consume in this country?</p> <p>A. 0.25 B. 0.5 C. 0.75 D. 0.8</p> <p>12. Other things remaining the same, when a country's currency appreciates, the country's CPI will</p> <p>A. decrease. B. increase. C. stay the same. D. change in an unknown direction.</p> <p>13. If a U.S. resident purchases a foreign bond, her transactions are included</p> <p>A. in the U.S. supply of loanable funds and the supply of dollars in the market for foreign-currency exchange. B. in the U.S. supply of loanable funds and the demand for dollars in the market for foreign-currency exchange. C. in the U.S. demand for loanable funds and the supply of dollars in the market for foreign-currency exchange. D. in the U.S. demand for loanable funds and the demand for dollars in the market for foreign-currency exchange.</p> <p>14. "Leaning against the wind" is exemplified by a(n)</p> <p>A. increase in the money supply when there is a recession. B. decrease in government expenditures when there is a recession. C. tax increase when there is a recession. D. tax cut there is an expansion.</p> <p>15. Suppose that the Federal reserve is concerned about the effects of rising stock prices on the economy. What could it do?</p> <p>A. buy bond to raise the interest rate B. buy bonds to lower the interest rate C. sell bonds to raise the interest rate D. sell bonds to lower the interest rate</p> <p>16. If the United States raised its tariff on European wines, then at the original exchange rate there would be a</p>					
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A. surplus in the market for foreign-currency exchange, so the real exchange rate would appreciate.

B. surplus in the market for foreign-currency exchange, so the real exchange rate would depreciate.

C. shortage in the market for foreign-currency exchange, so the real exchange rate would appreciate.

D. shortage in the market for foreign-currency exchange, so the real exchange rate would depreciate.

2 Problems

1. The market demand and supply functions for beer are:

$$Q^d = 14 - 0.04P,$$

$$Q^s = 2 + 0.08P.$$

a. (8 points) Calculate the market equilibrium and the consumer surplus.

b. (8 points) Suppose that beer is taxed at \$15 per unit. Calculate the deadweight loss generated by the tax. What percentage of the burden of the tax falls on producers?

2. Assume Taiwan is a small country and is currently under free trade. The demand curve of the pork market in Taiwan is $Q^d = 50 - P$ and the supply curve is $Q^s = P$.

a. (5 points) If the price of pork in the world market is 30, will Taiwan be an importer or an exporter of pork? How many units of pork will Taiwan import or export?

b. (5 points) If Taiwanese government plans to subsidize the local pork producers two dollars per unit of output, what will be the expected size of the total subsidies the government needs to spend?

c. (6 points) Please graphically compare the welfare of Taiwan before and after the policy. Please label your graphs clearly.

3. Consider a simple economy that produces only pizza. Suppose that the economy produces 100 pizzas in a year and its central bank has issued 300 \$1 bills. The velocity of money is 2.

a. (8 points) If people hold all money as currency, what is the quantity of money? What is the nominal GDP? What is the price of a pizza?

b. (8 points) If people hold all money as demand deposits and banks maintains a reserve ratio of 20%, what is the quantity of money? What is the nominal GDP? What is the price of a pizza?

c. (4 points) If people hold all money as demand deposits and the banks lower the reserves to 10% of the deposits while the yearly production of pizza increases to 120, what is the price of a pizza?

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選擇題請在答案卡上作答，否則不予計分。

第一部份：選擇題（單選題，每題 5 分，共 50 分）

1. Suppose that

$$f(x) = \begin{cases} 0 & \text{if } x \leq -1; \\ x^2 - 1 & \text{if } -1 < x \leq 1; \\ \ln(x) & \text{if } 1 < x \leq e; \\ g(x) & \text{if } x > e, \end{cases}$$

where g is a continuous function on (e, ∞) and $\lim_{x \rightarrow e^+} g(x) = 1$. Suppose that $\int_e^{\infty} g(x) dx = 1$. Which of the following statements is false?

- (a) $\int_{-1}^1 f(x) dx > -2$
 (b) $\int_1^e f(x) dx = 1$.
 (c) $\int_1^{\infty} f(x) dx < 3$
 (d) $\int_0^{\infty} f(x) dx = 5/3$
 (e) $\int_{-\infty}^{\infty} f(x) dx = 2/3$.

2. For every positive integer n , let $a_{k,n} = k/n$ for $k \in \{1, \dots, n\}$. Which of the following statements is false?

- (a) $\lim_{n \rightarrow \infty} \sum_{k=1}^n \sqrt{a_{k,n}}/n = 2/3$.
 (b) $\lim_{n \rightarrow \infty} \sum_{k=1}^n a_{k,n}^6/n = 1/7$.
 (c) $\lim_{n \rightarrow \infty} \sum_{k=1}^n \tan(\pi/4 - \pi a_{k,n}/4)/n = 2 \ln(2)/\pi$.
 (d) $\lim_{n \rightarrow \infty} \sum_{k=1}^n \sin(\pi a_{k,n}/2)/n = 1/\pi$.
 (e) $\lim_{n \rightarrow \infty} \sum_{k=1}^n \cos(\pi a_{k,n})/n = 0$.

3. Suppose that f and g are two functions such that $g'(x) = f'(x) = xe^x$ for $x \in (-\infty, \infty)$ and $f(0) = -1$. Which of the following statements is false?

- (a) $f(x) = -1 + \int_0^x te^t dt$ for $x \in (-\infty, \infty)$.
 (b) If $g(3) = e^3$, then $g(x) = f(x)$ for $x \in (-\infty, \infty)$.
 (c) If $g(2) = e^2$, then $g(x) = f(x)$ for $x \in (-\infty, \infty)$.
 (d) If $g(1) = 0$, then $g(x) = f(x)$ for $x \in (-\infty, \infty)$.
 (e) $f(100) > e^{100}$.

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4. Let $f(x) = \int_0^x t \sin(t) dt$ and $g(x) = \int_0^x t^2 \cos(t) dt$ for $x \in (-\infty, \infty)$. Which of the following statements is false?
- (a) $g(x) = x^2 \sin(x) - 2f(x)$ for $x \in (-\infty, \infty)$.
- (b) There exists some constant c such that $f(x) + x \cos(x) = c \sin(x)$ for $x \in (-\infty, \infty)$.
- (c) $f(x) = -f(-x)$ for $x \in (-\infty, \infty)$.
- (d) $f(\pi) = \pi$.
- (e) $g(\pi/2) = (\pi/2)^2 + 2$.
5. Let $f(x, y) = x^2 + y^2$ for $x, y \in (-\infty, \infty)$, $D_1 = \{(x, y) : x \in [0, 1] \text{ and } y \in [0, 1]\}$ and $D_2 = \{(x, y) : x^2 + y^2 \leq 1\}$. Which of the following statements is false?
- (a) $\int_{D_1} f(x, y) d(x, y) = 2/3$.
- (b) $\int_{D_2} f(x, y) d(x, y) > 1$
- (c) $\int_{D_1 \cap D_2} f(x, y) d(x, y) < 1/2$
- (d) $\int_{D_1 \cup D_2} f(x, y) d(x, y) > 2.5$
- (e) $\int_{D_1 \cup D_2} 1 d(x, y) = 1 + 3\pi/4$.
6. Let $D_1 = \{(x, y) : |x + y| \leq 1\}$ and $D_2 = \{(x, y) : |y - x| \leq 1\}$. Which of the following statements is false?
- (a) $\int_{D_1 \cap D_2} (x + y) d(x, y) = 0$.
- (b) $\int_{D_1 \cap D_2} (x - y) d(x, y) = 0$.
- (c) $\int_{D_1 \cap D_2} (x^2 - y^2) d(x, y) = 0$.
- (d) $\int_{D_1 \cap D_2} x^2 d(x, y) = 1/3$.
- (e) $\int_{D_1 \cap D_2} y^2 d(x, y) = 2/3$.
7. Let $f(u) = \int_0^u e^{-x^2} dx$ for $u \in (-\infty, \infty)$ and let $I = \lim_{u \rightarrow \infty} f(u)$. Which of the following statements is false?

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(a) f is strictly increasing on $(-\infty, \infty)$.

(b) $\int_{-\infty}^{\infty} e^{-x^2/2} dx = 2\sqrt{2}I$.

(c) $\int_{R^2} e^{-x^2-y^2} d(x, y) = 4I^2$.

(d) There exists some positive integer k such that $k\pi \int_0^{\infty} re^{-r^2} dr = I^2$.

(e) There exists some positive integer k such that $I = k\sqrt{\pi}/2$.

8. For $a \in (-\infty, \infty)$ and $b > 0$, define $G(a, b) = \int_0^{\infty} x^{a-1} e^{-x/b} dx$. Which of the following statements is false?

(a) $\lim_{a \rightarrow \infty} G(a, 1) < \infty$.

(b) $G(a, b) < \infty$ for $a > 0, b > 0$.

(c) $G(a, b) = b^a \overline{G(a, 1)}$ for $a > 1, b > 0$.

(d) $G(a+1, 1) = aG(a, 1)$ for $a > 1$.

(e) $G(a, 1) = \infty$ for $a < 0$.

9. For $m \geq 0, n \geq 0$, define $G(m, n) = \int_0^1 x^m (1-x)^n dx$. Which of the following statements is false?

(a) $0 \leq G(m, n) \leq 1$ for $m \geq 0, n \geq 0$.

(b) $(m+1)G(m, n+1) = (n+1)G(m+1, n)$ for $m \geq 0, n \geq 0$.

(c) $1/G(m, 2) = (m+1)(m+2)(m+3)$ for $m \geq 0$.

(d) $G(m, n) = G(n, m)$ for $m \geq 0, n \geq 0$.

(e) $G(m, 0) = 1/(m+1)$ for $m \geq 0$.

10. Which of the following integrals is ∞ ?

(a) $\int_0^2 x^{-0.5} dx$.

(b) $\int_0^1 \frac{\sin(x)}{x} dx$.

(c) $\int_2^{\infty} \frac{1}{x \ln(x)} dx$.

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$$(d) \int_0^{\infty} 2^{-x} dx.$$

$$(e) \int_1^{\infty} \frac{\ln(x)}{x^2} dx.$$

第二部份：計算題（共 50 分）

11. (20pt) Short questions, you just need to give the final answer in each part.

（此大題請直接填寫答案，不需要提供過程說明）

a. (5pt) $f\left(\frac{x^2-1}{x^2+1}\right) = x, x > 0$. Find $f'(0)$

b. (5pt) $f(x) = (\ln x)^{\frac{1}{x}}, x > 0$. Find $f'(e)$.

c. (5pt) $f(x) = (\ln x)^{\frac{1}{x}}, x > 0$. Find $\lim_{x \rightarrow \infty} f(x)$

d. (5pt) $f(x) = \frac{1-\cos(x)}{1+\cos(x)}$. Find $f'(x)$

12. (10pt) Show your work to get the points. (請提供計算過程說明)

Let $f(x) = 2^{-x} + 4^{-x} - 1, g(x) = (f(x))^{-1/x}$ for $x \geq -1, x \neq 0$. Find $g'(x)$.

13. (10pt) Show your work to get the points. (請提供計算過程說明)

Find the minimum distance from the origin to the surface $z^2 = xy + 1$.

14. (10pt) Show your work to get the points. (請提供計算過程說明)

Sketch graph of $f(x)$ and determine its maximum, minimum, inflection points, asymptotes if they exist

$$f(x) = \exp\left(-\frac{(x+1)^2}{4}\right), x \in R.$$

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