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A. Multiple Choice (45%)

1. Assume there are 10 people in the market, everyone has the same demand function for bananas $p = 38 - q$. If market supply function is $Q = 20 + 2P$.

1-1. What is the market equilibrium price and consumption per person?

- A) Price is 20 ; Consumption per person is 18
- B) Price is 24 ; Consumption per person is 7
- C) Price is 28 ; Consumption per person is 10
- D) Price is 30 ; Consumption per person is 8

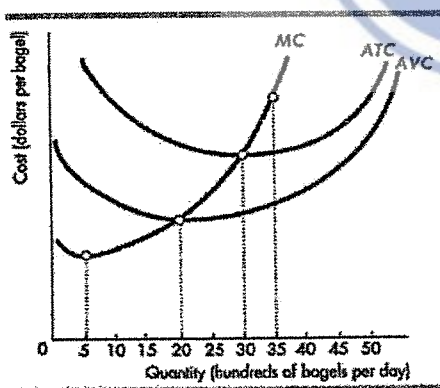
1-2. In this case, the government aims at helping the farmers by setting up a price floor on bananas $P = 32$, how many bananas government must acquire?

- A) 20 bananas
- B) 24 bananas
- C) 28 bananas
- D) 30 bananas

2. Suppose that the cross elasticity of demand for Microsoft computers with respect to Dell computers is 2.1. If Dell lowers its price by 5 percent, other things being equal, what will be the percentage change in the quantity of Microsoft computers demanded?

- A) 10.5 percent
- B) -10.5 percent
- C) 2.4 percent
- D) -2.4 percent

3. The figure shows the cost at Cream's Bakery.



3-1. After 3,000 bagels are produced each day, the ATC curve starts to slope upward because the

- A) AVC curve is rising.
- B) AFC curve (not shown) starts to slope upward.
- C) MC exceeds the ATC.
- D) MC curve slopes upward.

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- 3-2. If wages a firm pays its workers increase, then
- A) the firm's long-run average cost curve shifts upward.
 - B) the firm moves rightward along its long-run average cost curve to where it has diseconomies of scale.
 - C) the firm's long-run average cost curve does not shift and there is no movement along the long-run average cost curve.
 - D) the firm moves rightward along its long-run average cost curve but not necessarily to where it has diseconomies of scale.
4. Imperfect competition refers to any economic market that does not meet the rigorous assumptions of a hypothetical perfectly competitive market.
- 4-1. Which of the following markets will have the largest deadweight loss?
- A) A market that consists of perfectly competitive firms.
 - B) A market that consists of a single-price monopoly.
 - C) A market that consists of a perfect price discriminating monopoly.
 - D) None of the above. There is no deadweight loss as long as firms produce at the level of output where marginal revenue equals marginal cost.
- 4-2. Consider a two-firm industry producing two differentiated products indexed by $i=1,2$. Each firm produces its output at a constant marginal cost 0. Suppose that the demand functions for the two products are given by $q_1 = 24 - 2P_1 + P_2$ and $q_2 = 24 - 2P_2 + P_1$ respectively. Assume that two firms form a cartel, what is the price of the cartel?
- A) 10
 - B) 12
 - C) 15
 - D) 17
5. Citizens of the country of New Zealand produce dairy products and wool. In one year, they produced \$22 million worth of dairy products, \$15 million in New Zealand, and the other \$7 million sold to neighboring countries. They produced \$28 million worth of wool, with \$20 million consumed domestically and the other \$8 million sold to neighboring countries. They purchased \$8 million worth of steel from neighboring countries. What were GDP, GNP and NFP for this year?
- A) GDP was \$43 ; GNP was \$50 ; NFP was \$7
 - B) GDP was \$50 ; GNP was \$42 ; NFP was \$8
 - C) GDP was \$35 ; GNP was \$23 ; NFP was \$12
 - D) GDP was \$50 ; GNP was \$50 ; NFP was \$0

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6. The misery index has been a popular way of expressing national economic performance since the 1970s. Ronald Reagan won the 1980 presidential election with the help of the slogan "Are you better off than you were four years ago?". Which of the following statements of the misery index is FALSE?

- A) The misery index shows if people are generally happy or unhappy, depending on their economic conditions.
- B) The misery index is calculated using several economic factors, such as inflation and unemployment.
- C) The data relating to the economy's inflation in the U.S. comes from the Purchasing Power Parity.
- D) The misery index was developed by Arthur Okun.

7. In a small town of 120 people, there are 11 children under sixteen, 5 retired people, 80 people with full-time jobs, 5 people changing their careers, 5 people recent graduates searching for work, and 4 full-time homemakers. The remaining people lack the skills to work in the current market. What is the natural rate of unemployment in this town?

- A) 8%
- B) 12%
- C) 18%
- D) 20%

8. Assume that in a small economy system: Y is income, r is the interest rate, M^d is the monetary demand, M^s is the monetary supply, P is the price level, I is the investment, C is the consumption, G is the government expenditure, and T is the tax.

$$C = 100 + 0.8(Y - T), I = 500 - 5r, M^d = 0.2Y + 500 - 25r,$$

$$M^s = 1,200, G = 420, T = 400, P = 2$$

8-1. What are the government expenditure multiplier and monetary multiplier?

- A) $5/3$; $5/3$
- B) $5/2$; $4/3$
- C) $3/2$; $3/2$
- D) 2 ; $5/3$

8-2. If the government increases the expenditure from 420 to 570. What is crowding out effect?

- A) 5
- B) 10
- C) 15
- D) 20

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9. Economic growth is an increase in the production of economic goods and services, compared from one period of time to another.
- 9-1. According to the endogenous growth theory
- A) countries with the same technology and population growth eventually converge to the same steady-state growth rate independent of the savings rate
 - B) the steady-state growth rate decreases as the rate of accumulation of factors of production increases
 - C) the long-term growth rate of capital is not affected by the savings rate
 - D) the steady-state growth rate is affected by the rate at which the factors of production are accumulated
- 9-2. In a neoclassical growth model, if the capital-labor ratio is lower than the (optimal) steady-state level, we should expect that
- A) saving is smaller than the investment requirement
 - B) output per capita will temporarily grow at a rate lower than population growth
 - C) income per capita will decrease
 - D) there will be a temporary increase in the capital stock that is greater than the increase in population
10. In an IS-LM model with flexible exchange rates and perfect capital mobility, a restriction in money supply will
- A) decrease the level of output permanently but increase the interest rate only temporarily
 - B) decrease both the level of output and the interest rate but only temporarily
 - C) temporarily decrease the level of output and temporarily increase the interest rate
 - D) shift the LM-curve first to the left and then back to the right as the central bank is forced to buy foreign currency reserves
- B. Short Answer Questions (20%)
1. In the 1950s, A.W. Phillips, an economist at the London School of Economics, was studying the Keynesian analytical framework. The Keynesian theory implied that during a recession inflationary pressures are low, but when the level of output is at or even pushing beyond potential gross domestic product, or GDP, the economy is at greater risk for inflation. Phillips analyzed 60 years of British data and found the tradeoff between unemployment and inflation described in Keynesian theory, which became known as a Phillips curve.
- a. Explain the short-run and long-run Phillips curve.
 - b. Use the words and graphics to analyze the different of short-run and long-run Phillips curve.
2. The coronavirus (COVID-19) pandemic has impacted both demand for and supply of commodities: direct effects from shutdowns and disruptions to supply chains, indirect effects as economic growth stalls. Effects have already been dramatic, particularly for commodities related to transportation.
- a. Why did the government immediately adopt open market operations in the early days of the Covid19 outbreak, is it better to adopt fiscal policy or monetary policy?
 - b. Explain the effect of the policy you have chosen?

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C. Calculation Problems (35%)

- Suppose the demand for a good is $D(p) = 70 - p$. There are 2 firms in the market producing identical good. The firms are indexed by $\{1, 2\}$. All three firms have the same constant marginal cost, equal to 10.
 - Consider firm 1's quantity choice. How much does it want to produce? Write the elasticity of demand ϵ_d as a function of price P.
 - What is the total output quantity in the market in the Cournot equilibrium? What is the equilibrium respectively?
 - What is the output amount when all three firms are merged into a single firm and the marginal cost is still 10? What is the equilibrium? Is it stable? Why?
- A production function has constant returns to scale if increasing all factors of production by an equal percentage causes output to increase by the same percentage. Suppose that the economy i 's production is given as $Y_i = F(K_i, L_i) = K_i^{1/2}L_i^{1/2}$, $i=A$ or B , where Y_i , K_i and L_i are aggregate output, capital stock and labor of country i respectively. If we know the following facts about countries A and B:
 - $\delta = 0.05$ is the depreciation rate for both country A and B,
 - $k_i = K_i/L_i$ is the capital-labor ratio of country i ,
 - $s_a = 0.1$ which is the saving rate of country A,
 - $s_b = 0.2$ which is the saving rate of country B.
 - Suppose that the number of workers does now grow in both country A and B. The change of the capital stock Δk_i equals the amount of investment $sif(k_i)$, less the amount of depreciation δk_i . That is, $\Delta k_i = sif(k_i) - \delta k_i$. In steady state, the capital stock does not grow, so we can write this as $sif(k_i) = \delta k_i$. Find the steady-state value of (a) the capital stock per worker, (b) output per worker, (c) the growth rate of output per worker, and (d) the growth rate of output for these two countries.
 - Suppose that the number of workers now grows at -1% for two countries per year due to the impacts of population aging on the labor market. Recompute the answers in part a. What policy implication(s) can you draw from this demographic impact?

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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。

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

(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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選擇題請在答案卡上作答，否則不予計分。

- 1) The purpose of making assumptions in economic model building is to
 - A) force the model to yield the correct answer.
 - B) minimize the amount of work an economist must do.
 - C) simplify the model while keeping important details.
 - D) express the relationship mathematically.

- 2) Which of the following statements is a normative statement?
 - A) Minimum wage reduces employment.
 - B) Minimum wages causes surplus in labor market.
 - C) Minimum wage will improve the living of junior works more than senior workers.
 - D) Minimum wage should be welcomed by the low income class.

- 3) According to the Law of Demand, the demand curve for a good will
 - A) shift leftward when the price of the good increases.
 - B) shift rightward when the price of the good increases.
 - C) slope downward.
 - D) slope upward.

- 4) If the demand for oranges is written as $Q = 100 - 5p$, then the inverse demand function is
 - A) $Q = 5p - 100$.
 - B) $Q = 20 - .2p$.
 - C) $p = 20 - 5Q$.
 - D) $p = 20 - .2Q$.

- 5) The supply and demand for wheat is given by $Q_S = 200 + .2A + p$ and $Q_D = 500 - p$, where p is the price of wheat and A is the amount of rainfall (inches per year). The effect of an incremental increase in rainfall on equilibrium will be
 - A) a decrease the price of wheat by 10¢.
 - B) a decrease the price of wheat by 20¢.
 - C) an increase in the price of wheat by 20¢.
 - D) an increase in the price of wheat by 10¢.

- 6) If the demand curve for orange juice is expressed as $Q = 2000 - 500p$, where Q is measured in gallons and p is measured in dollars, then at the price of \$3, the price elasticity of demand equals
 - A) -0.33.

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- B) -3.
C) -9.
D) -17.
- 7) Suppose the demand curve is perfectly inelastic and the supply curve is upward sloping. The price sellers receive after a specific tax is imposed on sellers
- A) is less than before the tax.
B) is higher than before the tax.
C) is unchanged.
D) depends on the supply elasticity.
- 8) Indifference curves are downward sloping because of the assumption of
- A) completeness.
B) transitivity.
C) more is better.
D) All of the above.
- 9) With respect to consuming food and shelter, two consumers face the same prices and both claim to be in equilibrium. We therefore know that
- A) they both have the same budget line.
B) they both have the same total utility.
C) they both have the same marginal rate of substitution of food for shelter.
D) All of the above.
- 10) A movement upward along an upward-sloping Engel curve corresponds to
- A) upward-sloping indifference curves.
B) crossing indifference curves.
C) a rotation in the budget constraint.
D) a parallel shift in the budget constraint.
- 11) To separate the income and substitute effects, the imaginary budget line should be
- A) tangent to the new indifference curve and parallel to the new budget line.
B) tangent to the new indifference curve and parallel to the old budget line.
C) tangent to the old indifference curve and parallel to the new budget line.
D) tangent to the old indifference curve and parallel to the old budget line.

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- 12) A backward-bending labor supply curve could possibly imply which of the following cases?
- A) Leisure is an inferior good.
 - B) Leisure is a normal good.
 - C) Leisure is a normal good at low wages and inferior at high wages.
 - D) None of the above.
- 13) If the average productivity of labor equals the marginal productivity of labor, then
- A) the average productivity of labor is at a maximum.
 - B) the marginal productivity of labor is at a maximum.
 - C) Both A and B above.
 - D) Neither A nor B above.
- 14) The marginal rate of technical substitution always equals
- A) the slope of the total product curve.
 - B) the ratio of the marginal products of inputs.
 - C) the change in output due to a change in the amount of one input.
 - D) the distance between two isoquants.
- 15) The production function $Q = 0.8X + 0.6Y$ exhibits
- A) increasing return to scale.
 - B) decreasing returns to scale.
 - C) constant returns to scale.
 - D) economies of scale.
- 16) If the total cost of production for 1000 widgets is \$2000 and marginal cost is constant at \$1, what is the average fixed cost for the 1000 widgets?
- A) \$2
 - B) \$1.5
 - C) \$1
 - D) \$0.5
- 17) Learning by doing will result in
- A) an upward-sloping long-run average cost curve.
 - B) a larger long-run marginal cost than long-run average cost.
 - C) a rotation in the isocost curves.
 - D) lower long-run costs than short-run costs.

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18) Many universities have either a top football program or a top basketball program. Very few have both. These results suggest the presence of

- A) economies of scope.
- B) diseconomies of scope.
- C) economies of scale.
- D) diseconomies of scale.

19) In the absence of any government regulation on price, if a firm has no power to set price on its own, one can safely conclude

- A) the demand curve for the firm's product is horizontal.
- B) there aren't many firms in the industry.
- C) the market is in long-run equilibrium.
- D) the firms in this industry are not profitable.

20) If there are 100 identical firms in competitive market. Each firm's total cost function is $TC = 10 + (0.1 * q^2)$, in which q is firm's output. The market supply curve is

- A) $Q = 1000 * p$.
- B) $Q = 500 * p$.
- C) $Q = 100 * p$.
- D) $Q = 10$.

21) In the long run, profits will equal zero in a competitive market because of

- A) constant returns to scale.
- B) identical products being produced by all firms.
- C) the availability of information.
- D) free entry and exit.

22) Suppose the market supply curve is $p = 5 + Q$. At a price of 10, producer surplus equals

- A) 50.
- B) 25.
- C) 12.50.
- D) 10.

23) A competitive market maximizes social welfare because in a competitive market,

- A) profits are zero.
- B) price equals marginal cost of the last unit produced.

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- C) price equals average cost of the last unit produced.
 D) there is free entry and exit.
- 24) When comparing partial-equilibrium effects to general-equilibrium effects, one can conclude that
 A) general-equilibrium effects are always larger.
 B) partial-equilibrium effects are always larger.
 C) the effects are of equal size.
 D) one cannot determine before the fact which effect is greater.
- 25) Moving away from the contract curve will
 A) harm both parties.
 B) harm only one of the parties.
 C) harm at least one of the parties.
 D) harm neither of the parties.
- 26) Gains from trade will be possible as long as
 A) people have different endowments.
 B) people place different values on some goods.
 C) marginal rates of substitution are equal across individuals.
 D) excess supply equals excess demand.
- 27) In a competitive marketplace, prices adjust until
 A) MRS's are equal to zero.
 B) excess supply equals excess demand equals zero in all markets.
 C) each consumer has maximized utility subject to his budget constraint.
 D) all firms earn zero profit.
- 28) One difference between a monopoly and a competitive firm is that
 A) only a monopoly is a price taker.
 B) only a monopoly maximizes profit by setting marginal revenue equal to marginal cost.
 C) only a monopoly faces a downward-sloping demand curve.
 D) None of the above.
- 29) If the inverse demand curve a monopoly faces is $p = 100 - 2Q$, and MC is constant at 16, then profit maximization is achieved when the monopoly sets price equal to
 A) 16.

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- B) 21.
C) 25.
D) 58.
- 30) If the demand curve a firm faces is perfectly elastic, then the ratio of the firm's price to the marginal cost is
A) 0.
B) 1.
C) 2.
D) None of the above—the answer cannot be determined.
- 31) Which of the following total cost functions suggests the presence of a natural monopoly?
A) $TC = 2Q$
B) $TC = 100 + 2Q$
C) $TC = 100 + 2Q^2$
D) All of the above.
- 32) A perfect price discriminator
A) charges each buyer's reservation price.
B) charges different prices to each customer based upon different costs of delivery.
C) generates a deadweight loss to society.
D) charges lower prices to customers who buy greater quantities.
- 33) Two-part tariffs offer a mechanism whereby the firm can
A) charge two different prices to distinct groups of customers.
B) collect two times as much from consumers as a single-price monopoly can.
C) capture some or all of the consumer surplus.
D) reduce some of its fixed costs.
- 34) Tie-in sales are most advantageous to the seller when
A) the demands for the two goods are negatively correlated.
B) the demands for the two goods are positively correlated.
C) the demands for the two goods are unrelated.
D) there are economies of scope.
- 35) Chess is an example of a
A) game with perfect information.

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- B) game with imperfect information.
 C) game with incomplete information.
 D) game with no information.
- 36) For an oligopolistic firm, which of the following can be identified as a strategy?
 A) Produce 10,000 units regardless of what the rivals do.
 B) Advertise if the rival advertises, do not advertise if the rival does not advertise.
 C) Raise the price if the rival raises the price, keep the current price if the rival lowers its price.
 D) All of above
- 37) Oligopoly differs from monopolistic competition in that an oligopoly includes
 A) product differentiation.
 B) barriers to entry.
 C) advertising.
 D) downward-sloping demand curves facing the firm.
- 38) In a sense, a cartel is self-destructive because
 A) it reduces consumer surplus.
 B) it sets price above marginal cost.
 C) each cartel member has the incentive to cheat on the cartel.
 D) each cartel member earns economic profit.
- 39) In the Cournot model, if a firm's marginal cost increases, its best-response function will
 A) shift inward.
 B) not change.
 C) shift outward.
 D) The shift is ambiguous.
- 40) The outcome of the Stackelberg model is
 A) a Nash equilibrium.
 B) the same as the Cournot outcome.
 C) that the follower earns zero profit.
 D) that the follower cannot be on its best-response curve.
- 41) The Bertrand model is a more plausible model of firm behavior than the Cournot model
 A) when firms set the quantity to be sold.

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- B) when firms sell a differentiated product.
 C) because firms that sell a non-differentiated product typically act as price takers.
 D) because the Bertrand model predicts that firms will price at marginal cost.
- 42) Monopolistically competitive firms
 A) have market power because they can set price above marginal cost.
 B) have no market power because they earn zero economic profit.
 C) have no market power because of free entry.
 D) have no market power because price equals marginal cost.
- 43) Minimum efficient scale refers to the lowest level of output at which
 A) the firm can earn a minimum profit.
 B) average cost is minimized.
 C) the firm will operate at minimum level.
 D) the marginal cost curve is minimized.
- 44) If a firm is a price taker in both the labor market and the output market, it will
 A) earn zero economic profit in the short run.
 B) hire labor until the marginal product of labor equals zero.
 C) hire labor until the marginal revenue product equals the output price.
 D) hire labor until the marginal revenue product equals the wage rate.
- 45) Suppose a person has a discount rate of zero. This implies she
 A) places no value on the future.
 B) places no value on the present.
 C) values the present and the future equally.
 D) would not lend money at any positive interest rate.
- 46) A risk-preferring person is willing to pay
 A) a risk premium.
 B) a fee to make a fair bet.
 C) to obtain decreasing marginal utility.
 D) None of the above.
- 47) If two events are perfectly positively correlated, then
 A) diversification is not necessary since there is no risk.

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- B) diversification eliminates all risk.
 C) diversification does not reduce risk at all.
 D) diversification only cuts the risk in half.
- 48) The existence of externalities is due mainly to the fact that
 A) monopolies tend to produce too little of a good anyway.
 B) the optimal level of pollution is zero.
 C) pollution is not a serious problem.
 D) property rights are poorly defined.
- 49) Adverse selection can occur when
 A) all persons involved in a transaction have full information.
 B) one person has information not available to others.
 C) post-agreement incentives result in workers shirking.
 D) nobody has any information about a particular product.
- 50) Moral hazard occurs when contracts are written in such a way that
 A) agents will wish to minimize the principal's utility.
 B) the interests of agent and principal diverge.
 C) agents will wish to maximize the principal's utility.
 D) production and risk-bearing efficiency are achieved.
- 51) Which of the following is NOT a central issue in macroeconomics?
 A) How should the central bank of a country fight inflation?
 B) What is responsible for high and persistent unemployment?
 C) How do tax changes influence consumers' choices of what to buy?
 D) What factors determine economic growth?
 E) What can or should the government do to stabilize the economy?
- 52) Macroeconomics does NOT focus on
 A) policies that affect consumption and saving
 B) policies that affect the performance of health care providers
 C) the determination of changes in wages and prices
 D) the determination of interest rates
 E) none of the above, all of them are macroeconomic issues

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- 53) The GDP-deflator and the producer price index (PPI) differ since
- A) the PPI measures a fixed market basket but the GDP-deflator doesn't
 - B) the GDP-deflator includes imported goods but the PPI doesn't
 - C) the PPI includes more goods than the GDP-deflator
 - D) the GDP-deflator does not include services but the PPI does
 - E) the GDP-deflator measures increases in inflation earlier than the PPI
- 54) If the budget surplus increases, which of the following is likely to happen?
- A) imports will increase more than exports
 - B) exports will increase more than imports
 - C) private domestic saving will increase more than private domestic investment
 - D) private domestic investment will remain the same while private domestic saving will increase
 - E) private domestic investment will decrease
- 55) Which of the following is NOT a source of long-term output growth?
- A) growth in consumption expenditures
 - B) growth in labor inputs
 - C) growth in capital inputs
 - D) improved technological efficiency
 - E) growth in the stock of knowledge
- 56) If we assume a Cobb-Douglas production function where the share of capital is equal to 0.2 and the share of labor is equal to 0.8, then the marginal product of capital is equal to
- A) $5N/K$
 - B) $5Y/K$
 - C) $Y/4K$
 - D) $Y/5K$
 - E) Y/K
- 57) In the neoclassical growth model, an increase in the rate of population growth will
- A) raise the growth rate of output
 - B) increase the level of output per capita
 - C) increase the steady-state capital-labor ratio
 - D) all of the above
 - E) only B) and C)

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58) Which of the following would tend to make the multiplier smaller?

- A) an increase in the marginal propensity to consume
- B) an increase in the marginal propensity to save
- C) a reduction in taxes
- D) a reduction in government spending
- E) none of the above

59) If $C = 2000 + .9Y_D$, what increase in government spending must occur for equilibrium output to increase by 1000?

- A) 100
- B) 200
- C) 250
- D) 500
- E) 1000

60) The money demand curve will shift to the left when which of the following occurs?

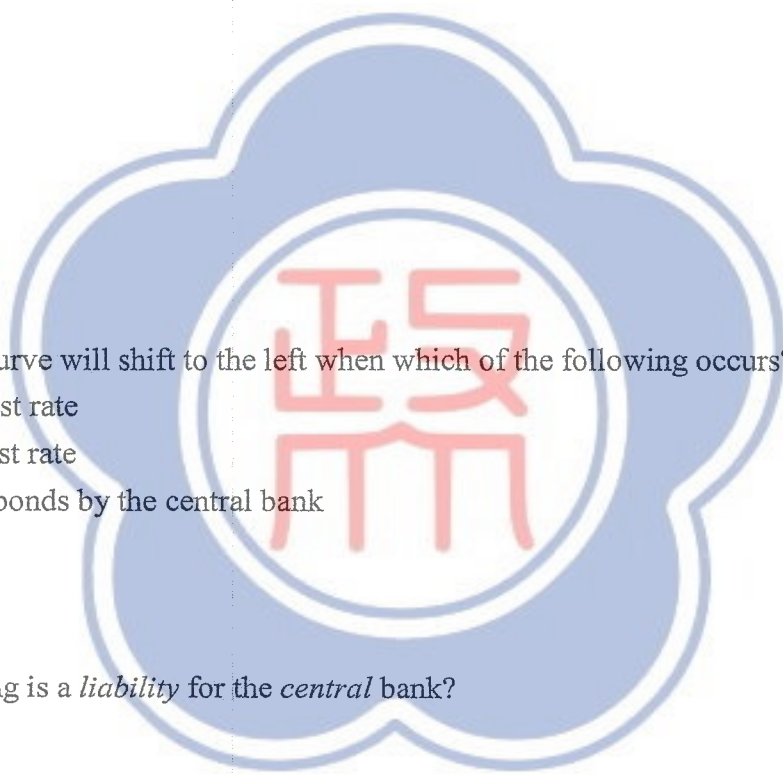
- A) a reduction in the interest rate
- B) an increase in the interest rate
- C) an open market sale of bonds by the central bank
- D) an increase in income
- E) none of the above

61) Which of the following is a *liability* for the *central* bank?

- A) currency
- B) bonds
- C) savings accounts
- D) loans
- E) checkable deposits

62) Which of the following events will cause the interest rate to increase?

- A) an open market sale of bonds
- B) an increase in the reserve deposit ratio
- C) an increase in income
- D) all of the above



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- 63) Which of the following conditions will most likely coincide with the existence of a liquidity trap?
- A) inflation is rising
 - B) inflation is constant
 - C) inflation is zero
 - D) individuals prefer to hold only money and not bonds
 - E) the real interest rate is negative
- 64) Suppose policy makers decide to reduce taxes. This fiscal policy action will cause which of the following to occur?
- A) The LM curve shifts and the economy moves along the IS curve.
 - B) The IS curve shifts and the economy moves along the LM curve.
 - C) Both the IS and LM curves shift.
 - D) Neither the IS nor the LM curve shifts.
 - E) Output will change causing a change in money demand and a shift of the LM curve.
- 65) A reasonable dynamic assumption for the IS-LM model is that
- A) the economy is always on both the IS and LM curves.
 - B) the economy is always on the IS curve, but moves only slowly to the LM curve.
 - C) the economy is always on the LM curve, but moves only slowly to the IS curve.
 - D) the money market is quick to adjust, but the bond market adjusts more slowly.
 - E) adjustment to the new IS-LM equilibrium is instantaneous after an LM shift, but not after an IS shift.
- 66) With a nominal interest rate of 10% per year, the present discounted value of \$200 to be received in two years is
- A) \$82.64.
 - B) \$90.91.
 - C) \$165.29.
 - D) \$181.82.
 - E) \$220.00.
- 67) Which of the following statements is *false*?
- A) A bank's assets are its uses of funds.
 - B) A bank issues liabilities to acquire funds.
 - C) The bank's assets provide the bank with income.
 - D) Bank capital is recorded as an asset on the bank balance sheet.

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- 68) Which of the following represents the participation rate?
- A) the ratio of the number employed to the size of the labor force
 - B) the ratio of the number employed to the civilian noninstitutional population
 - C) the ratio of the labor force to the civilian noninstitutional population
 - D) the ratio of the labor force to the total number of employed and unemployed workers
- 69) Efficiency wage theory suggests that
- A) workers will be paid less than their reservation wage.
 - B) productivity might drop if the wage rate is too low.
 - C) the government can only set tax rates so high before people will prefer not to work.
 - D) unskilled workers will have a lower turnover rate than skilled workers.
 - E) firms will be more resistant to wage increases as the labor market tightens.
- 70) Which of the following will most likely cause a change in the natural rate of unemployment?
- A) changes in monetary policy
 - B) changes in fiscal policy
 - C) changes in expected inflation
 - D) all of the above
 - E) none of the above
- 71) In the Phillips curve equation, which of the following will cause an increase in the current inflation rate?
- A) an increase in the expected inflation rate
 - B) a reduction in the unemployment rate
 - C) an increase in the markup
 - D) all of the above
 - E) none of the above
- 72) Okun's law shows that when the unemployment rate is above the natural rate,
- A) inflation is higher than expected.
 - B) inflation is lower than expected.
 - C) output is below potential.
 - D) output is above potential.
- 73) Disposable income equals
- A) income minus saving.
 - B) income minus both saving and taxes.

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- C) consumption minus taxes.
 D) the sum of consumption and saving.
 E) none of the above
- 74) Which of the following will cause a reduction in output per worker in the long run?
 A) capital accumulation or technological progress
 B) capital accumulation
 C) an increase in the number of workers
 D) expansionary monetary policy
 E) none of the above
- 75) Which of the following will *not* cause an increase in aggregate output (Y) in the long run?
 A) an increase in N
 B) an increase in K
 C) an increase in technology
 D) a reduction in the saving rate
 E) none of the above
- 76) Decreasing returns to capital (K) implies that a 4% increase in K will cause
 A) a reduction in output per worker (Y/N).
 B) a reduction in K/N.
 C) N to increase by exactly 4%.
 D) Y to increase by less than 4%.
 E) no change in N/Y.
- 77) The capital-labor ratio will tend to decrease over time when
 A) investment per worker equals saving per worker.
 B) investment per worker is less than saving per worker.
 C) investment per worker exceeds depreciation per worker.
 D) saving per worker equals depreciation per worker.
 E) output per worker exceeds capital per worker.
- 78) Which of the following represents the change in the capital stock?
 A) consumption minus depreciation
 B) output minus depreciation
 C) investment minus saving

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D) investment minus depreciation

79) Human wealth is

- A) the present discounted value of expected future after-tax labor income.
- B) the sum of financial and housing wealth.
- C) the discounted present value of all financial assets.
- D) financial wealth minus housing wealth.
- E) total wealth minus housing wealth.

80) Which of the following will occur when the capital stock falls?

- A) profit per unit of capital will increase
- B) profit per unit of capital will decrease
- C) there will be no change in profit per unit of capital
- D) there will be an ambiguous effect on profit per unit of capital
- E) none of the above

81) Which of the following will cause a reduction in current consumption?

- A) a reduction in current disposable income
- B) a reduction in financial wealth
- C) a reduction in human wealth
- D) all of the above
- E) both B and C

82) Which of the following, all else fixed, will cause the real exchange rate to increase?

- A) a nominal depreciation
- B) a reduction in the foreign price level
- C) a reduction in the domestic price level
- D) all of the above
- E) none of the above

83) A change in which of the following variables will have *no* direct effect on domestic demand?

- A) domestic income
- B) foreign income
- C) government spending
- D) the interest rate
- E) none of the above

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- 84) An increase in the marginal propensity to import will cause
- A) the multiplier to increase and a given change in government spending (G) to have a larger effect on domestic output.
 - B) the multiplier to increase and a given change in government spending (G) to have a smaller effect on domestic output.
 - C) the multiplier to decrease and a given change in government spending (G) to have a larger effect on domestic output.
 - D) the multiplier to decrease and a given change in government spending (G) to have a smaller effect on domestic output.
- 85) The quantity of imports will decrease when there is
- A) an increase in the real exchange rate.
 - B) a reduction in domestic output.
 - C) a reduction in foreign output.
 - D) all of the above
 - E) none of the above
- 86) In an open economy, which of the following will cause a reduction in the size of the multiplier?
- A) an increase in the marginal propensity to import
 - B) an increase on foreign output
 - C) a reduction in the marginal propensity to save
 - D) all of the above
 - E) none of the above
- 87) Which of the following is a function of money?
- A) medium of exchange
 - B) provides protection from inflation
 - C) it is a flow variable
 - D) all of the above
 - E) none of the above
- 88) A change in the reserve requirement changes
- A) the monetary base.
 - B) the money multiplier.
 - C) the discount rate.
 - D) all of the above

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E) none of the above

89) The existence of inflation does which of the following?

- A) reduces tax distortions
- B) reduces shoe-leather costs
- C) allows for the possibility of negative real interest rates
- D) reduces the costs associated with money illusion

90) GDP in current dollars is equivalent to which of the following?

- A) real GDP
- B) GDP in terms of goods
- C) GDP in 2000 dollars
- D) GDP in constant dollars
- E) none of the above

91) Which of the following calculations will yield the correct measure of real GDP?

- A) divide nominal GDP by the consumer price index
- B) divide the GDP deflator by the consumer price index
- C) multiply nominal GDP by the consumer price index
- D) multiply nominal GDP by the GDP deflator
- E) none of the above

92) Which of the following factors is *not* believed to affect output in the long run?

- A) technology
- B) monetary policy
- C) the size of the labor force
- D) the capital stock

93) The Phillips curve describes the relationship between

- A) output growth and unemployment.
- B) inflation and output growth.
- C) output growth and money supply.
- D) inflation and unemployment .

94) Which of the following is true for a "closed economy"?

- A) government spending equals taxes

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- B) there are no imports or exports
 C) exports equal imports
 D) there is no saving
 E) there is no government spending or taxes
- 95) In studying growth theory, we
 A) assume that labor, capital, and raw materials are all used efficiently
 B) assume that increased use of inputs cannot lead to a higher living standard
 C) assume that technological advances cannot affect living standards
 D) try to explain the reasons for recessions and booms
 E) all of the above
- 96) In the simple macro model, the long-run AS-curve is
 A) horizontal
 B) vertical
 C) upward-sloping
 D) assumed to be completely price elastic
 E) either B) or C), depending on how fast prices adjust
- 97) In the very long-run AD-AS model, if the AD-curve shifts to the left, then
 A) prices and output will both decrease
 B) prices and output will both increase
 C) prices will decrease but output will remain the same
 D) output will decrease but prices will remain the same
 E) output will increase but prices will decrease
- 98) Potential GDP is the value of GDP that can be calculated if we assume that
 A) there are no measurement errors
 B) the unemployment rate is zero
 C) the inflation rate is zero
 D) GDP has been adjusted for inflation
 E) the capital stock is working at full capacity and we have full employment
- 99) For a simple economy with no depreciation, no government, and no foreign sector, which of the following identities would be correct?
 A) $Y \equiv C$

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- B) $C - I \equiv S$
- C) $Y - C \equiv S$
- D) $Y - C \equiv S + I$
- E) $Y \equiv C + S - I$

100) Assume that $GDP = 4,800$, consumption = 3,400, private domestic savings = 400, government purchases = 1,200, and net exports = -120. Which of the following is true?

- A) disposable income is 3,800
- B) private domestic investment is 320
- C) the budget deficit is 200
- D) all of the above
- E) only A) and C)



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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注意事項:

- (1) 不可使用計算機。
- (2) 請依題號順序作答, 並於答案卷中清楚標示各題與各小題題號。
- (3) 答題若過程錯誤 (或沒有過程) 但答案正確, 將以「零分」計算。

1. (Total:10%) Suppose the sample space \mathcal{S} is the interval of real numbers $(0, 5)$. If we define the sets $A_n = (1 - n^{-1}, 2 + n^{-1})$ and $B_n = (n^{-1}, 3 - n^{-1})$, for $n = 1, 2, 3, \dots$

(1) (5%) Find $A_1 \cap A_2 \cap \dots = \bigcap_{n=1}^{\infty} A_n = ?$.

(2) (5%) Find $B_1 \cup B_2 \cup \dots = \bigcup_{n=1}^{\infty} B_n = ?$.

2. (Total:25%) Let the random variable X be the absolute value of the difference of the surfaces on a roll of a pair of fair 6-sided dice, each with the numbers 1 through 6 on it. The sample space $\mathcal{S} = \{(i, j) : 1 \leq i, j \leq 6\}$. the random variable X is $X(i, j) = |i - j|$.

(1) (5%) List the space (range) of X .

(2) (5%) Find the probability density function (pdf) of X .

(3) (5%) Let $F_X(x)$ define the cumulative distribution function (cdf) of X , what is $F_X(x)$?

(4) (5%) Find $F_X(3.5) = ?$.

(5) (5%) Find the expected value $\mathbb{E}[X] = ?$.

3. (Total:10%) Let X have the cumulative distribution function (cdf) as

$$F_X(x) = \begin{cases} 0, & x < 0 \\ x/2, & 0 \leq x < 1 \\ 1, & 1 \leq x \end{cases}$$

(1) (5%) Find the probability $\mathbb{P}(-1 < X \leq 1/2) = ?$

(2) (5%) Find the probability $\mathbb{P}(X = 1) = ?$

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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注意事項:

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- (2) 請依題號順序作答，並於答案卷中清楚標示各題與各小題題號。
- (3) 答題若過程錯誤 (或沒有過程) 但答案正確，將以「零分」計算。

4. (Total:20%) The probability density function (pdf) of X is

$$f(x) = \begin{cases} c \cdot (1-x), & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

- (1) (5%) Find the value of c so that $f(x)$ is a valid pdf.
 - (2) (5%) Find the expected value $\mathbb{E}[X] = ?$.
 - (3) (5%) Find the expected value $\mathbb{E}[X^2] = ?$.
 - (4) (5%) Find the variance $\text{Var}(3X) = ?$
5. (Total:20%) Let X_1 and X_2 have the joint probability density function (joint pdf) as

$$f(x_1, x_2) = \begin{cases} x_1 + x_2, & 0 < x_1 < 1, 0 < x_2 < 1 \\ 0 & \text{otherwise} \end{cases}$$

- (1) (5%) Find the marginal pdf of X_2 .
 - (2) (5%) Find the probability $\mathbb{P}(X_1 \leq 1/2) = ?$
 - (3) (10%) Find the probability $\mathbb{P}(X_1 + X_2 \leq 1) = ?$
6. (Total:15%) Let X be a Bernoulli random variable with probability of success p . Suppose we want to test, at the level of significance α , $H_0 : p = p_0$ against $H_1 : p = p_1 < p_0$, where p_0 and p_1 are specified. Let X_1, X_2, \dots, X_n be a random sample of size n from the distribution of X and $S = \sum_{i=1}^n X_i$ be the total number of successes in the sample.
- (1) (10%) Define the appropriate critical region C for this test in terms of S .
 - (2) (5%) For the critical region C defined above, what is the probability of Type II error?

備

註

- 一、作答於試題上者，不予計分。
- 二、試題請隨卷繳交。