※所有題目請於「非選擇題作答區」依題號順序作答。

Part I：選擇題（共五十分，一題五分。選擇題為單選題，不必提供理由及過程。）

1. Wang hates exams and loves chocolates. Wang's utility function over exams (E) and chocolates (C) is $U(E,C) = \sqrt{C} - 3E$. Wang has 2 exams on his schedule and has 64 chocolates in his pocket. What is the largest number of chocolates that he would be willing to give up in return for taking only one exam?
   (a) 28
   (b) 20
   (c) 35
   (d) 39
   (e) 15

2. The demand function for milk is $Q = 120 - 5P$ and the supply function for milk is $Q = 10 + 6P$, where P is the price of milk and Q is the quantity of milk. The government makes it illegal to sell milk for a price over 6 dollars per unit. How many units of excess demand will be there in the market?
   (a) 16
   (b) 26
   (c) 34
   (d) 44
   (e) None of the above.

3. Continue from 2. To avoid shortages, the government decides to pay milk sellers enough of a subsidy for each unit of milk so as to make supply equal demand. The government has to subsidy
   (a) 4 dollars for each unit of milk.
   (b) 8 dollars for each unit of milk.
   (c) $\frac{5}{3}$ dollars for each unit of milk.
   (d) $\frac{10}{3}$ dollars for each unit of milk.
   (e) None of the above.

4. Alice is growing a crop where the only risk is a flood. Floods are known to occur with probability 0.1. If a flood occurs, her harvest is worth \$1000. Otherwise, she will have harvest worth \$3000. She may insure the harvest against a flood at a percent insurance premium $\gamma = 0.2$. That is, if Alice purchases insurance policy worth C dollars, Alice pays $0.2C$ in both cases and would get C if a flood occurs. Alice aims to maximize her expected utility.
   (a) If Alice's utility function of wealth is $\ln(W)$, she will choose C=\$2000.
   (b) If Alice's utility function of wealth is $\ln(W)$, she will choose C=\$3000.
   (c) If Alice's utility function of wealth is $\ln(W)$, she will choose C=\$1500.
   (d) If Alice's utility function of wealth is $2W + 3$, she will choose C=0.
   (e) If Alice's utility function of wealth is $2W + 3$, she will choose C=\$2000.

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5. Alaka likes guns and tobacco. She owns a factory which produces 15 guns and 8 units of tobacco every week. She has no other source of income. Her preference over guns and tobacco is convex. The market prices are $2 per gun and $10 per unit of tobacco. At these prices, she chooses to sell nothing and buy nothing.
   (a) If only the price of gun rises, Alaka will be worse off .
   (b) If only the price of gun rises, Alaka will be better off .
   (c) If both prices rise, she will be worse off, but if only one price rises, she might be better off or worse off, depending on her tastes.
   (d) If prices change in any way, she will certainly be no worse off and maybe better off.
   (e) None of the above.

6. Vanessa is a farmer. Her farm yields 5 eggs and 10 tomatoes. In addition, she has $10 from the government. Her utility function over eggs (E) and tomato (T) is $U(E,T) = ET$. The current prices are $2 per egg and $1 per tomato. Vanessa will consume
   (a) More than 5 eggs and more than 10 tomatoes
   (b) More than 5 eggs and less than 10 tomatoes
   (c) Less than 5 eggs and more than 10 tomatoes
   (d) Less than 5 eggs and less than 10 tomatoes
   (e) 5 eggs and 10 tomatoes

7. Mr. Brown will live for only two periods. In the first period he will earn $100,000. In the second period he will retire and live on his savings. Mr. Brown has a utility function $U(C_1, C_2) = C_1^2 C_2$, where C_1 is his period 1 consumption and C_2 is his period 2 consumption. The interest rate is r. Which of the following is true?
   (a) A change in the interest rate won't affect his saving.
   (b) He will consume the same amount in each period.
   (c) He will consume more in period 2.
   (d) He will save 50,000.
   (e) None of the above.

8. Dan, Nick and Jillian live together. They consume a private good (X) and a public good (Y). Their utility functions over X and Y are $U^D(X_D, Y) = X_D Y$, $U^N(X_N, Y) = 2X_N Y$, and $U^J(X_J, Y) = 2X_J Y$ respectively. Dan has income $50, Nick has income $30, and Jillian has income $20. The prices of private good and public good are $1. What is the efficient amount of public good for them to consume?
   (a) 20
   (b) 30
   (c) 40
   (d) 50
   (e) None of the above.

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9. Continue from 8. Assume now that Jillian is moved away and the public good is financed by private contributions from Dan and Nick.
   If Dan decides to contribute 20 dollars to fund the public good, what is the best response of Nick?
   (a) Nick's best response is to contribute 5 dollars.
   (b) Nick's best response is to contribute 10 dollars.
   (c) Nick's best response is to contribute 20 dollars.
   (d) Nick's best response is to contribute nothing.
   (e) None of the above.

10. Continue from 9 -- Jillian is moved away and the public good is financed by private contributions from Dan and Nick.
    In the Nash Equilibrium, what is the amount of public good?
    (a) $\frac{50}{3}$
    (b) 20
    (c) $\frac{70}{3}$
    (d) 30
    (e) None of the above.

Part II：問答題（共五十分。）

11. **[15 points]** Suppose that a firm has a production function:

$$f(x_1, x_2) = \min\{x_1, 2x_2\} + \min\{2x_1, x_2\}.$$

Let w_i be the price for input $i = 1, 2$, and y be the output level.
(a) [5 points] Draw an isoquant.
(b) [5 points] Find the cost function for this technology.
(c) [5 points] Find the demand functions for inputs 1 and 2, conditional on the output level y.

12. **[20 points]** Consider an exchange economy with two consumers, A and B, and with two goods, x and y. The preferences for the consumers are:

$$U_A(x_A, y_A) = x_A^2 + y_A^2,$$

$$U_B(x_B, y_B) = x_B + \alpha \ln y_B,$$

where $\alpha > 0$. Consumer A's endowment is $(\omega_A^x, \omega_A^y) = (1, 1)$, and consumer B's endowment is $(\omega_B^x, \omega_B^y) = (1, 1)$.
(a) [5 points] Characterize the Pareto optimal allocations.
(b) [10 points] Find the Walrasian equilibrium price and allocation. Does the equilibrium always exist?
(c) [5 points] Does the First Fundamental Theorem of Welfare Economics hold in this example? Explain and verify your answer.

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13. **[15 points]** A monopolist sells its product to a consumer in two periods. The consumer buys one unit of the product in each period. The quality of the product can be either good (G) or bad (B). If the product is good, the consumer can enjoy a utility of u (a positive constant). If the quality is bad, the consumer obtains no utility. The quality of the product cannot change over time once it is determined in the first period.

The price in period t is p_t, $t = 1, 2$. Therefore, the net utility for the consumer in each period is $u - p_t$ if he buys a good-quality product, and $-p_t$ if he buys a bad-quality product. If he does not buy the product, his net utility is 0. However, the consumer cannot observe the quality of the product in the beginning of the game. He only knows that the product is of good quality with probability λ. On the other hand, after he buys the product, he will learn its quality immediately.

In the first period, the monopolist bears a fixed cost c_G to produce a good-quality product, and c_B to produce a bad-quality product. We assume that $0 < c_B < c_G < u$. There is no cost in the second period. Suppose that the discount factor is β for everyone.

The timing of the game is as follows. In the first period: (1) the monopolist decides the quality of the product. (2) The monopolist decides the price p_1. (3) The consumer decides whether to buy the product or not. In the second period: (1) the monopolist sets the price p_2. (2) The consumer decides whether to buy the product again or not.

Discuss the monopolist's optimal price and quality decisions, and the consumer buying behavior.

試題隨卷繳回