國立臺灣大學113學年度碩士班招生考試試題

題號：88

科目：個體經濟學

選擇題：請於『答案卡』作答。每題均至少有一個正確答案。不必提供理由或過程。共 10 題，每題 10 分。

計分方式：各題所有選項均答對者，得10分。每答錯一個選項扣4分，未作答者或答錯超過二個選項者，該題以零分計算。例如某題正確答案為(A)(B)(C)，而某考生所選之答案為(A)(C)(E)，則該考生答錯兩個選項，包括(B)選項應選而未選、(E)選項不應選而選，因此該考生該題得2分。其餘情況以此類推。各題分數均獨立計算，不影響其他題分數。

1. A consumer's diet consists of two foods, a basic good and a fancy good. The basic good is high in calories but is less tasty. The fancy good is tasty but is low in calories. Every basic good provides 2 calories and 1 unit of taste. On the other hand, every fancy good provides 1 calorie and 4 units of taste. If a diet consists of b basic good and f fancy good, then the calories of this diet are $2b + f$. The total taste of this diet is $b + 4f$.

   The consumer needs at least 1200 calories to survive. Therefore, the consumer meets the calorie requirement first. Hence, for any two diet plans, if both offer strictly less than 1200 calories, the consumer prefers the one with higher calories and is indifferent if both plans offer the same calories. If one plan has less than 1200 calories and the other has at least 1200 calories, the consumer prefers the one having at least 1200 calories. Finally, if both diet plans offer at least 1200 calories, since both meet the calorie requirement to survive, the consumer prefers the diet that is tastier and is indifferent if both are equally tasty.

   Which of the following statements is (are) TRUE?

   (A) The indifference curves exhibit a diminishing marginal rate of substitution.
   (B) There is no utility function that can represent the consumer's preference.
   (C) If the prices of both foods are 1 and the consumer's income is 1000, the consumer will spend all income on the basic good.
   (D) The basic good cannot be an inferior good.
   (E) If the prices of both foods are 1 and the consumer's income is 1600, the consumer will spend all income on the fancy good.

2. **[Continue from Question 1.]** The consumer's income is 300. Suppose that the price of the fancy good is fixed at 1. In the following, when decomposing the total effect, calculate the Slutsky substitution effect and the remaining income effect. Recall that the Slutsky substitution effect indicates how the consumer substitutes one good for the other when a price changes but the purchasing power remains constant by making the original optimal consumption still affordable.

   (A) When the price of the basic good is 1, the optimal diet is to spend all income on the basic good.
   (B) If the price of the basic good increases from 1 to 1.5, the substitution effect is zero.
   (C) If the price of the basic good increases from 1 to 3, the substitution effect is the total effect.
   (D) If the price of the basic good decreases from 0.5 to 0.25, the income effect is negative.
   (E) The demand curve of the basic good is downward sloping.

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3. A profit-maximizing bakery uses labor (l) and capital (k) to produce cookies (c). The bakery is small: it is a price taker in the cookie market, the labor market and the capital market. A production plan consists of the cookies the bakery produces, and the labor and the capital it uses. If the profit-maximizing production plan is not unique, the bakery chooses a plan arbitrarily. Hence, when we observe that the bakery chooses a production plan at a price combination, it means that the chosen plan generates a weakly larger profit than any unchosen plan. For convenience, denote the price of cookies by p_c, the price of labor by w and the price of capital by r. Moreover, we observe that when $(p_c, w, r) = (1, 1, 1)$, the bakery produces 4 cookies using 1 labor and 1 capital, or $(c, l, k) = (4, 1, 1)$. We also observe that when $(p_c, w, r) = (2, 2, 1)$, the bakery uses 2 labor and 2 capital. However, due to data loss, we do not know how many cookies the bakery produces.

   Which of the following statements is (are) TRUE?

(A) The bakery can produce 8 cookies by using 2 labor and 2 capital.

(B) The bakery produces at least 5.5 cookies by using 2 labor and 2 capital.

(C) If the prices are $(p_c, w, r) = (1, 2, 1)$, it is possible that the bakery chooses to use 1 labor and 2 capital.

(D) If the prices are $(p_c, w, r) = (2, 1, 1)$, the bakery will not choose the production plan $(c, l, k) = (4, 1, 1)$.

(E) It is possible that the bakery chooses to produce strictly fewer cookies when the price of cookies increases.

4. Suppose that we have three workers: an able, a mediocre and an unable. Their marginal products are 3, 2, 1, respectively. The price of output is normalized to 1. We assume a competitive labor market. If workers don't work, they idle at home. Because the more able workers dislike idling at home more, their reservation payoff when idling at home is 0, 1, and 1.8, respectively. Workers work if the wage they receive is at least as much as their reservation payoff.

   Which of the following statements is (are) TRUE?

(A) When firms can observe the marginal products, the unable worker idles at home. The able and the mediocre work.

(B) Pareto efficiency implies that all workers should work.

(C) When firms cannot observe the marginal products, they offer one wage. The less capable workers are the ones choosing to work at any given wage.

(D) When firms cannot observe the marginal products, the equilibrium wage is 2. Then, too many workers work.

(E) Suppose that the workers can acquire a certificate to signal. For both the able and the mediocre workers, the cost of acquiring a certificate is 0.1. For the unable worker, the cost is 1. When firms cannot observe the marginal product, there is an equilibrium in which both the able and the mediocre workers acquire a certificate. Upon seeing the certificate, the firms offer 2.5 as the wage. Hence, both the able and the mediocre work. The unable does not acquire a certificate. Upon not seeing the certificate, the firms offer 1 as the wage. The unable does not work. In terms of who works and who doesn't work, this equilibrium is efficient.

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5. In a gasoline market, there are two firms, Firm A and Firm B, competing in the Cournot fashion. Their products are homogeneous. They use the following total cost functions, respectively:

$$\text{Firm A: } TC_A(q) = 25q, \text{ and Firm B: } TC_B(q) = 50q.$$

The market demand is:

$$p = 250 - Q,$$

where Q is the total output in the market. During the holiday season, they engage in a "discount battle," wherein they both offer discounts for larger purchases simultaneously. Specifically, Firm i offers a price schedule, $\left((\bar{p}_i, \bar{q}_i), (\bar{\bar{p}}_i, \bar{\bar{q}}_i)\right)$, $i = A, B$, where the price is $\bar{p}_i$ for quantities $0 \le q_i < \bar{q}_i$, and the price is $\bar{\bar{p}}_i$ for quantities $\bar{q}_i \le q_i \le \bar{\bar{q}}_i$, and $\bar{p}_i > \bar{\bar{p}}_i$ and $\bar{q}_i < \bar{\bar{q}}_i$. The Cournot equilibrium price schedules are $\left((\bar{p}_A^*, \bar{q}_A^*), (\bar{\bar{p}}_A^*, \bar{\bar{q}}_A^*)\right)$ and $\left((\bar{p}_B^*, \bar{q}_B^*), (\bar{\bar{p}}_B^*, \bar{\bar{q}}_B^*)\right)$.

Which of the following statements regarding the Cournot equilibrium is (are) TRUE?

(A) $\bar{\bar{q}}_A^* > \bar{\bar{q}}_B^*$, i.e., Firm A produces more than Firm B does.
(B) $\bar{p}_A^* < \bar{p}_B^*$.
(C) $\bar{\bar{p}}_A^* = \bar{\bar{p}}_B^* > 50$.
(D) Firm A earns a higher profit than Firm B does.
(E) Compared to the case where neither firm uses discounts, they each earn more if they use discounts.

6. An inventor creates a new technology. However, it faces the threat of potential infringement by an imitator, and thus, the inventor has the option to initiate a lawsuit against the imitator. If the imitator does not mimic the technology, the inventor stands to gain a profit of $R > 0$, while the imitator receives nothing. However, if the imitator mimics the technology and the inventor files a lawsuit, not only will the inventor secure a profit of R, but the court will also impose a fine on the imitator who needs to pay the inventor an amount of $f > 0$. Filing a lawsuit, however, incurs a cost of $c > 0$ (e.g., hiring a lawyer in advance). On the other hand, if the inventor chooses not to file a lawsuit, the imitator can capture a portion of the market, resulting in the inventor obtaining only θR and the imitator obtaining $(1-\theta)R$, where $0 < \theta < 1$. The inventor cannot observe the imitator's decision, so it is assumed that the actions of both players are made simultaneously. The normal form of this game is represented as follows:

		Imitator: Mimicking	Imitator: Not mimicking
Inventor	Suing	$R+f-c, -f$	$R-c, 0$
	Not suing	$\theta R, (1-\theta)R$	$R, 0$

Which of the following statements regarding the Nash equilibrium is (are) TRUE?

(A) There always exists a pure-strategy Nash equilibrium.
(B) It is possible to have multiple mixed-strategy Nash equilibria.
(C) Focusing on the mixed-strategy Nash equilibrium, when R becomes higher (which means that the profit of having the invention is higher), other things being equal, it is more likely that the imitator will mimic the technology.
(D) Focusing on the mixed-strategy Nash equilibrium, when the fine f becomes higher, other things being equal, it is less likely that the imitator will mimic the technology.
(E) Focusing on the mixed-strategy Nash equilibrium, when the lawsuit cost c becomes higher, other things being equal, it is less likely that the inventor will file the lawsuit.

見背面

7. Consider an underground exchange economy among three inmates in a jail, A, B, and C. Each inmate wants two goods: food (x_1) and cigarettes (x_2). The initial endowment that inmate i owns is (e_1^i, e_2^i), where $i = A, B, C$. Currently, $(e_1^A, e_2^A) = (1,3)$, $(e_1^B, e_2^B) = (2,2)$ and $(e_1^C, e_2^C) = (3,1)$. Their preferences can be represented by the following utility functions:

A: $u(x_1^A, x_2^A) = x_1^A + x_2^A$, B: $u(x_1^B, x_2^B) = x_1^B + 2x_2^B$, and C: $u(x_1^C, x_2^C) = 2x_1^C + x_2^C$.

The prices of food and cigarettes are p_1 and p_2, respectively, which are normalized to $p_1 = p$ and $p_2 = 1$.

Which of the following statements is (are) TRUE?

(A) It is a Pareto optimal allocation if every inmate has 2 units of each good.

(B) The competitive equilibrium price under the trilateral trade is $p^* = 1$.

(C) The equilibrium allocation after the trilateral trade is for inmate A to have $(x_1^A, x_2^A) = (2,2)$.

(D) If B only wants to trade with C and vice versa, then the equilibrium price under this bilateral trade will be higher than that under the trilateral trade involving all inmates.

(E) Compared to the case of the bilateral trade between inmates B and C, every inmate will be weakly better off if they trade trilaterally.

8. Two laundries located along a river provide homogeneous services at a price p, engaging in Cournot-style competition. The market demand for their services is given by:

$$p = a - Q,$$

where Q is the total output. Throughout the production process, Firm U, located upstream of the river, releases wastewater into the river. Consequently, Firm D, located downstream, incurs additional costs to mitigate and clean the pollutants. The profit functions of Firm U and Firm D, respectively, are:

Firm U: $\pi_U = pq_U - cq_U$, and Firm D: $\pi_D = pq_D - cq_D - \eta \cdot (q_U)^2$.

q_U and q_D are the output levels of Firms U and D, respectively. c is the marginal production cost for each firm and is assumed that $c < a$. Moreover, $\eta \cdot (q_U)^2$ is the external cost suffered by Firm D caused by Firm U's pollution. $\eta > 0$ is a constant, which measures the severity of the externality.

Suppose that Firm D has the property right of the river. They both agree to let an arbitrator fix the externality problem. The arbitrator aims to maximize the joint profit of these two firms, $\pi_U + \pi_D$. The solution is referred to as the "joint profit maximum." To do so, the arbitrator demands that Firm U pay Firm D a unit fee r for each unit of output that Firm U produces. Under the arbitration, the profit functions of Firm U and Firm D, respectively, become:

Firm U: $\pi_U = pq_U - cq_U - rq_U$, and Firm D: $\pi_D = pq_D - cq_D - \eta \cdot (q_U)^2 + rq_U$.

Let the unit fee at which the joint profit maximum is achieved be r^*.

Which of the following statements is (are) TRUE?

(A) The equilibrium market price under Cournot competition without the arbitration is lower than that under the joint profit maximum chosen by the arbitrator.

(B) Compared to the joint profit maximum, both firms produce too much in the Cournot equilibrium without the arbitration.

(C) The consumers who purchase their laundry services are better off under the arbitration because the externality is reduced (i.e., the consumer surplus is higher after the arbitration).

(D) To achieve the joint profit maximum, the unit fee r^* can be larger than $(a - c)$ if η is sufficiently large (i.e., when the externality is very severe, it requires a much higher fee).

(E) The more severe the externality, the higher the optimal r^* is needed to correct the externality.

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9. Consider a game played by a government and a worker (she). The game is composed of two stages:
Stage 1: The government imposes a wage income tax with a rate of $t \in [0, 1]$ on the worker.
Stage 2: After observing t, the worker decides whether or not to work. If she decides to work, she then chooses the hours of working, $\ell > 0$.
If the worker decides to work for $\ell > 0$ hours, she can receive an income of $w \cdot \ell$, where w is the hourly wage. However, she also has to put forth some efforts in working, which incurs a cost of ℓ^2. Thus, the worker's payoff is $(1-t)w\ell - \ell^2$. If she instead chooses not to work, she receives an exogeneous unemployment benefit b. As for the government, it chooses an optimal t to maximize the total income tax revenue, which equals to $tw\ell$ if the worker works for $\ell > 0$ hours. By contrast, if the worker is not working, the government's payoff is $-b$ because it has to pay for the unemployment benefit but receives no tax revenue.
Which of the following statements regarding the subgame perfect Nash equilibrium is (are) TRUE?
(A) In the equilibrium, the worker always chooses to work.
(B) The equilibrium tax rate is $1/2$.
(C) As the wage increases, the worker will work for more hours.
(D) A higher wage rate corresponds to increased tax revenues for the government.
(E) The worker can at least obtain b.

10. Jimmy is an expected utility maximizer. He has an increasing utility function v in wealth. Moreover, it is concave. In other words, he is risk averse. With initial wealth w, he rejects a lottery of winning 11 dollars with probability 0.5 and losing 10 dollars with probability 0.5. This means $v(w) > 0.5v(w+11) + 0.5v(w-10)$. Let us decompose $v(w+11)$ into a sum of marginal utilities. That is:
$v(w+11) = [v(w+11) - v(w+10)] + [v(w+10) - v(w+9)] + \cdots + [v(w+1) - v(w)] + v(w)$.
Similarly,
$v(w-10) = [v(w-10) - v(w-9)] + [v(w-9) - v(w-8)] + \cdots + [v(w-1) - v(w)] + v(w)$.
Recall that because the utility function v is concave, $v(w-9) - v(w-10)$ is greater than $v(w-8) - v(w-9)$ and so on.
Which of the following statements is (are) TRUE?
(A) We can infer that $v(w+11) - v(w+10) < \left(\frac{10}{11}\right) \cdot [v(w-9) - v(w-10)]$.
(B) If Jimmy also rejects this lottery when his initial wealth increases to $w+20$, we can infer that $v(w+31) - v(w+30) < \left(\frac{10}{11}\right) \cdot \left(\frac{10}{11}\right) \cdot [v(w-9) - v(w-10)]$.
(C) If Jimmy rejects this lottery no matter what his initial wealth is, we can infer that $v(w+41) - v(w+40) < \left(\frac{10}{11}\right) \cdot \left(\frac{10}{11}\right) \cdot [v(w+1) - v(w)]$.
(D) If Jimmy rejects this lottery no matter what his initial wealth is, for any positive integer x, $v(w+20x) - v(w) < 11[v(w+20) - v(w)]$.
[Hint: In answering this question, you may want to decompose both the left-hand side and the right-hand side of the inequality to a sum of marginal utilities as before. For instance, first compare $[v(w+20x) - v(w+20x-1)]$ with $\left(\frac{10}{11}\right)^{x-1}[v(w+20) - v(w+19)]$, then compare $[v(w+20x-1) - v(w+20x-2)]$ with $\left(\frac{10}{11}\right)^{x-1}[v(w+19) - v(w+18)]$ and so on. After all the comparisons are done, sum up both sides to see what you observe.]

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(E) If Jimmy rejects this lottery no matter what his initial wealth is, with the initial wealth w, when he faces a sure gain of 20 dollars and a lottery which gives him a huge gain of 200,000,000 dollars with probability $\frac{1}{11}$, Jimmy prefers the former.

試題隨卷繳回