題號： 114
科目：個體經濟學
節次： 1

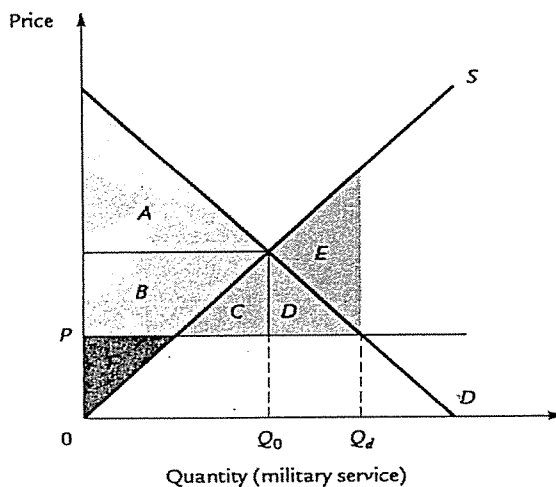國立臺灣大學 105 學年度碩士班招生考試試題

題號： 114
共 7 頁之第 1 頁

第一部分：單選題(共 35 分)。請於試卷內之「選擇題作答區」依序作答。

請注意：本部份題目，每題只有一個正確答案。不必提供理由或過程。共 7 題，每題 5 分。

1. [Two-part tariff] Suppose that you are the monopoly owner of a movie theatre. You can allow people to enter the theatre at zero marginal cost, and you can provide popcorn at a constant marginal cost of $0.50 per bag. You have two customers, John and Mike, who are identical twins. John never buys popcorn under any circumstances. If you charge the monopoly price of $1.00 per bag for popcorn, Mike will buy 2 bags of popcorn and earn $0.50 in consumer's surplus, and you will earn $1.00 in profit from popcorn sales. If you charge the competitive price of $0.50 per bag for popcorn, Mike will buy 4 bags of popcorn and earn $2.00 in consumer's surplus, and you will earn no profit from popcorn sales. Suppose that John is willing to pay up to $8.00 to see the movie and Mike is willing to pay up to $5.00 to see the movie. How much should you charge for admission to the theatre and how much should you charge for popcorn if you are pursuing maximum profit?
   (A) $4.00 for theatre admission; $1.00 for a bag of popcorn.
   (B) $5.00 for theatre admission; $0.50 for a bag of popcorn.
   (C) $6.00 for theatre admission; $1.00 for a bag of popcorn.
   (D) $7.00 for theatre admission; $0.50 for a bag of popcorn.
   (E) $8.00 for theatre admission; $0.50 for a bag of popcorn.

2. [Welfare] Military services are supplied by young people and demanded by society through the armed forces. The following figure shows the demand and supply of military services. We assume that the wage rate is set at P, so that more young people are demanded than will volunteer. If the army can draft (by random draw) as many young people as it wants to at the price P, it will choose the quantity Q_d, and the subsequent deadweight loss will be:
   (A) A.
   (B) E.
   (C) C+D+E.
   (D) C+D.
   (E) Not shown in the figure.

Quantity (military service)

見背面

題號： 114
科目：個體經濟學
節次： 1

國立臺灣大學 105 學年度碩士班招生考試試題

題號： 114
共 7 頁之第 2 頁

3. [Information] Continued from the previous questions. If, on the other hand, the army is permitted to draft (by random draw) only Q_0 young people, the subsequent deadweight loss will be:
    (A) Zero.
    (B) E.
    (C) C+D+E.
    (D) C.
    (E) Not shown in the figure.

4. [Common property] A small town named York has a park that never gets crowded. Picnics in the park are the only recreational activity available in York, with each picnic worth $2 for everyone in the town. One day the town council decides to build a zoo, financed by a donation from Bill Gates. Admission to the zoo is free. However, the zoo is small and is always crowded. Assuming that all residents in York have identical tastes, how much utility in terms of money will the zoo bring to each of them?
    (A) $0.
    (B) $1.
    (C) $2.
    (D) More than $2.
    (E) None of the above.

5. [Planned obsolescence] Jack's Light Bulb Company can produce light bulbs that burn for 1,000 hours or light bulbs that burn for 3,000 hours. The cost of production is the same in either case. Assume that Jack is a monopoly in both light bulb markets, and that for a consumer replacing a light bulb does not incur any cost. Which kind of light bulbs should Jack produce?
    (A) The short-lived light bulbs.
    (B) The long-lived light bulbs.
    (C) Both the short-lived and the long-lived light bulbs.
    (D) Neither the short-lived nor the long-lived light bulbs.
    (E) No deterministic answer to this question.

6. [Risk] What type(s) of individual will always choose a risk-free basket against a risky basket when offered a bet at fair odds?
    (A) A risk-neutral individual.
    (B) A risk-averse individual.
    (C) A risk-preferring individual.
    (D) Risk-neutral and risk-averse individuals.
    (E) Risk-neutral and risk-preferring individuals.

題號： 114
科目：個體經濟學
節次： 1

國立臺灣大學 105 學年度碩士班招生考試試題

題號： 114
共 7 頁之第 3 頁

7. [Property rights] Before 1972, all major league baseball (MLB) players had contracts containing a *reserve clause*. The reserve clause forbade the player from attempting to sell his services to any other team directly. If the Chicago White Sox wanted to acquire a player from the New York Yankees, the White Sox had to buy that player's contract from the Yankees. They could not simply offer him a higher salary to try to lure him away. In 1970, the reserve clause was eradicated, and players became *free agents* who can sell their services to the highest bidder. Assume that the reform did not alter transaction costs, and that there were no budget constraints that would prevent transactions from happening. According to Coase Theorem, which of the following should be true:

(A) The reform did not alter the allocation of players to teams, neither did it change the welfare of players or teams.

(B) The reform enabled wealthiest teams to buy up the best players.

(C) More capable players benefited from the reform, while less capable ones did not.

(D) Better teams suffered from the reform, while worse teams benefited from it.

(E) All teams suffered from the reform, while all players benefited from it.

第二部分：單複選混合題(共 35 分)。請於試卷內之「選擇題作答區」依序作答。

請注意：本部份題目，每題只有一個或兩個正確答案。不必提供理由或過程。共 7 題，每題 5 分。

8. [Production] A firm uses three inputs, labor (L), capital (K), and land (T). Its production function is:
$$f(L,K,T) = \sqrt{L \cdot K \cdot T}.$$
Let w be the wage, r the interest rate, and c the cost of land. Which of the following statements is (are) TRUE?

(A) In the short run where capital and land cannot be adjusted, the average cost curve is U-shaped (i.e., it is decreasing first and then increasing as the output increases).

(B) In the short run where capital and land cannot be adjusted, other things being equal, the marginal cost will increase when c increases.

(C) In the medium long run where only land cannot be adjusted, the average cost curve is U-shaped.

(D) In the very long run where every factor can be adjusted, the average cost curve is horizontal.

(E) In the very long run where every factor can be adjusted, other things being equal, to produce the same amount of output, the firm will use more L and K when c increases.

9. [Labor supply] Jerry consumes three goods: n, c and x, where n is a leisure good, c is the consumption that is bundled with n, such as food, and x is another good that is consumed separately from leisure, such as housing. His utility function is:
$$u(n,c,x) = \sqrt{n \cdot c} + x.$$
There is a time constraint, $l + n = 24$, where l is the working hours. The wage rate is w, the price of c is p_c, and the price of x is p_x. In addition to the labor income, he also has a fixed rental income y. Which of the following statements is (are) TRUE?

(A) There is a backward-bending part of the labor supply curve.

(B) He always works harder when y becomes higher.

(C) He always consumes more x when y becomes higher.

(D) When w is sufficiently low, he does not work at all.

(E) He always works harder when p_c increases.

見背面

題號： 114
科目：個體經濟學
節次： 1

國立臺灣大學 105 學年度碩士班招生考試試題

題號： 114
共 7 頁之第 4 頁

10. [Competitive equilibrium] In an isolated island there live three persons, Xena, Yanni, and Zima. The island only has two goods, anchovies (a) and bananas (b). Their utility functions are:
$$u_x(a,b) = 2a + b, \ u_y(a,b) = \min\{a, b\}, \ u_z(a,b) = a + 2b.$$
Xena has an endowment $(a, b) = (0, 1)$, Yanni has $(a, b) = (0, 1)$, and Zima has $(a, b) = (2, 0)$. The price of anchovies is p and the price of bananas is normalized as 1. Which of the following statements regarding the competitive equilibrium is (are) TRUE?

(A) There is a trade between Xena and Zima, but Yanni is unwilling to trade with either of them.

(B) The equilibrium price is $p^* > \frac{1}{2}$.

(C) After the trade, Xena consumes only anchovies.

(D) After the trade, Yanni's expenditure on anchovies is more than that on bananas.

(E) After the trade, Zima consumes both anchovies and bananas.

11. [Monopoly] Wonderful Airline (WA) is the only airline company in a small island, who can set the price of the airline tickets. It faces a demand function:
$$q = a - 2p,$$
where $a > 0$ is a measure of the market size. It uses two factors, labor (L) and capital (K). In the factor markets, however, WA is a price taker. It uses a production function:
$$f(L, K) = \sqrt{LK}.$$
Moreover, w is the wage rate and r is the interest rate. Suppose that currently, $a = 16$ and $w = r = 2$. Which of the following statements is (are) FALSE?

(A) The current market equilibrium price is p^*, where $p^* \in [3.5, 6.5]$.

(B) The firm currently makes a positive profit.

(C) Other things being equal, if the market size is expected to drop from $a = 16$ to $a = 9$ in the next year, WA will make a loss and leave the market at that time.

(D) In the current equilibrium, the firm hires labor with an amount of $L^* \in [2.5, 4.5]$.

(E) Other things being equal, if the wage is expected to drop from $w = 2$ to $w = 1$ in the next year, the consumers who buy the airline tickets will be better off at that time.

12. [Utility maximization] George's preference for two goods, x_1 and x_2, can be represented by the following utility function:
$$u(x_1, x_2) = [x_1] + 2 \cdot [x_2],$$
where $[x_i]$ means the greatest integer function of x_i (for example, $[2.8] = 2$). In other words, he only cares about the integer part of x_i. Suppose that George has an income $Y = 15.6$. Let the price of x_1 be normalized as $p_1 = 1$, and the price of x_2 be $p_2 = p$. In the optimum, which of the following statements is (are) IMPOSSIBLE to happen?

(A) He buys both x_1 and x_2 when $p = 1$.

(B) He buys only x_2 when $p > 2$.

(C) All the income is used up.

(D) Given the same Y, he buys fewer x_1 and more x_2 when p decreases.

(E) Given the same prices, he buys both goods more when Y increases.

接次頁

題號： 114
科目：個體經濟學
節次： 1

國立臺灣大學 105 學年度碩士班招生考試試題

題號： 114
共 7 頁之第 5 頁

13. [Pubic goods] Two professors, a senior tenured one (player 1) and a junior untenured one (player 2), are jointly writing a paper. They each spend time t_i in the joint work. The probability of the paper being successfully published is $p(T) \in [0,1]$, which depends on the total amount of time that they spend in writing the paper, $T = t_1 + t_2$. Assume that $p'(T) > 0$ and $p''(T) < 0$. The benefit of this publication is R_i. Assume that $0 < R_1 < R_2$, which means that this publication is more valuable to the junior professor. Player i's payoff function is thus $p(T)R_i - t_i$. The "efficient" amount of time T^s is determined by maximizing the total payoff of both players. The Nash equilibrium is a pair of (t_1^*, t_2^*) in which each player only considers his own payoff. We consider the case where both $T^s, T^* > 0$. Which of the following statements is (are) FALSE?

(A) The efficient level T^s is higher when the publication is more valuable to them, i.e., when $R_1 + R_2$ is higher.

(B) Compared to the efficient level, they are too lazy in writing the paper in the Nash equilibrium, i.e., $T^* < T^s$.

(C) In the Nash equilibrium, the junior professor spends more time in writing the paper, i.e., $t_2^* > t_1^*$.

(D) In the Nash equilibrium, the senior professor spends a positive time in writing the paper, i.e., $t_1^* > 0$.

(E) The equilibrium T^* depends on both R_1 and R_2.

14. [Dynamic pricing] In a scenic spot, there are three souvenir stores that sell the same product. Their locations are shown in the following figure. A customer wants to buy a souvenir. He is now standing in front of store 1. If he decides to buy it in this store, he pays the price p_1 set by store 1, from which he obtains $\theta - p_1$, where θ is the utility of owning this souvenir. If he decides not to buy it in this store, he can either leave and stop shopping, in which case he obtains 0, or he can walk to the next store, in which case he suffers a cost of x. After visiting store 2, if he decides to buy it in store 2, he pays p_2 and thus obtains $\theta - x - p_2$; if he decides to leave with an empty hand, he obtains $-x$; and if he decides to keep shopping, the cost of walking to store 3 is x. After visiting store 3, if he decides to buy it there, he pays p_3 and thus obtains $\theta - 2x - p_3$; and if he decides to leave without buying, he obtains $-2x$. We assume that $\theta > 2x$, which means that it is worth having a free souvenir even if he needs to walk to store 3. We also assume that there is no production cost for every store, and so each store just maximizes the price that can be charged. Which of the following statements can best describe the equilibrium outcome?

(A) The equilibrium prices are such that $p_1^* > p_2^* > p_3^*$

(B) The customer buys the souvenir immediately in store 1.

(C) The lower x, the more likely that he buys the souvenir from the farther stores.

(D) The equilibrium price charged by store 2 is such that $x < p_2^* < \theta$.

(E) The customer may buy the souvenir from store 3 if θ is sufficiently high.
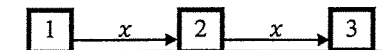
見背面

第三部分：簡答題(共 15 分)。請於試卷內之「非選擇題作答區」作答，並註明題號。

請注意：本部份題目，請用英文作答，答案超過字數限制者將扣分。共 3 題，每題 5 分。

JT seeks price hikes, emboldened by inflation drive
From *Nikkie Aisan Review*, January 23, 2016

TOKYO -- Japan Tobacco plans to raise prices on its core cigarette lineup to pass rising costs on to customers amid calls from the government to support inflation.

The company on Friday said it has applied for permission to price its Mevius products at 440 yen ($3.70) per box, 10 yen above the current level, starting April 1. Approval could come as soon as February. The change is aimed at funding "continued investment to improve product quality and service," said Mutsuo Iwai, head of JT's tobacco operations.

Japan's Ministry of Finance requires tobacco companies to obtain permission before changing prices, but has been hesitant to grant that permission in the past. Cigarette prices in Japan are therefore less than half those in many countries, where they can climb above 1,000 yen. That attitude is in part a concession to lawmakers in Japan's ruling Liberal Democratic Party who fear that higher prices would cut cigarette consumption and thus knock income to leaf tobacco farmers, an important support base.

The ministry remained resistant to a hike even when JT rebranded its mainstay Mild Seven line to Mevius in February 2013, forcing the company to absorb heavy costs associated with redesigning packaging and filling out the lineup.

But the ministry's stance appears to have changed amid calls by Prime Minister Shinzo Abe's government for companies to support price growth by passing costs associated with the weakening yen and other factors on to consumers. The ministry has little choice but to approve JT's request to do just that.

Other companies could make similar moves. "If the Mevius price hike is approved, we'll certainly follow in JT's footsteps," an executive at a foreign tobacco company said.

But opinion on raising prices remains mixed. Taxes account for around 60% of the price of cigarettes. Raising those taxes is discussed periodically within the ruling party. But the idea continues to draw resistance from lawmakers. A convincing explanation will be necessary for JT's application to win approval, a tax authority within the LDP said Friday.

15. [5 points] What do you learn from this article about the price elasticity of cigarette demand? Explain your answers. [Use no more than 30 words]

16. [5 points] If increasing the price of cigarettes is beneficial, why didn't Japan Tobacco do it before? [Use no more than 30 words]

17. [5 points] If the tax rate is fixed at 60% for cigarettes despite the government's decision, will the government's revenue increase or decrease after the price hike application is approved? Why? [Use no more than 30 words]

第四部分：計算分析題(共 15 分)。請於試卷內之「非選擇題作答區」作答，並註明題號。

請注意：本部份題目，請詳述計算過程並說明理由。

Consider a game played by a corrupt official and a police. The official already has a fixed salary y, but he may still embezzle some money from the government. The amount of the embezzled money is e. The official is risk averse and has the following utility function:

$$u(e) = p \ln(y - f \cdot e) + (1 - p) \ln(y + e),$$

where $p \in [0,1]$ is the probability that he is caught by the police when he steals the money. In such a case, he needs to pay a fine with a rate f. On the other hand, if he is not caught, he receives the extra money e without being punished.

The police tries to stop the crime. He also has a fixed salary w; however, if he catches the criminal when an amount of e has been stolen, he receives some an extra bonus with a rate of b. Catching the criminal is costly though; he needs to bear an effort cost of $p^2/2$. Thus, his payoff function is:

$$v(p) = p(w + b \cdot e) + (1 - p)w - \frac{p^2}{2}.$$

They simultaneously make the decision upon e and p, respectively.

18. **[6 points]** Draw the reaction function for each player. Find the Nash equilibrium (e^*, p^*).

19. **[9 points]** Analyze whether or not <u>each</u> of the following independent policies can effectively discourage embezzlement. Provide an economic intuition for your finding.
    (1) An increase in the official's salary y.
    (2) An increase in the police's bonus b.
    (3) An increase in the rate of fine f.

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試題隨卷繳回

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