Principle of Economics: Homework 1, Unit 1 - Unit 10

Multiple Choice Questions

Choose the most appropriate answer for each question.

1. Min has three options when he applied to college: the Economics Department, the Accounting Department, and the Finance Department at NTU. He ultimately chose Economics at NTU. Assuming Min has rational preferences (理性偏好) among the three options, which of the following statements is most accurate?

   (A) It is possible that Min prefers NTU Finance over NTU Accounting and also prefers NTU Accounting over NTU Economics.
   (B) After entering NTU, Min finds that his experience in the Economics Department is less enjoyable than he had expected. The opportunity cost of choosing NTU Economics has increased.
   (C) The opportunity cost of Min choosing NTU Economics is the department he would have selected if NTU Economics were not an option.
   (D) After entering NTU Economics, Min accidentally breaks up with his girlfriend because he spends too much time studying. The emotional harm from this breakup can be considered part of his opportunity cost.

   Solution. Answer: C

   (A) Min chose Economics, which would be irrational if these were his true preferences. Since we're told Min has rational preferences, this cannot be correct.
   (B) Opportunity cost is based on the next best alternative forgone at the time of decision, not on how things turned out afterwards. Whether the experience was better or worse than expected doesn't change the original opportunity cost.
   (D) The breakup is a consequence that occurred after the decision was made. Opportunity cost only considers what was given up at the moment of choice - the next best alternative available at the time of decision. Subsequent events (like the breakup) are not part of opportunity cost.

2. When bottled water is priced at \$25 per bottle, Ting purchases 3 bottles. When the price drops to \$20 per bottle, Ting buys 4 bottles, and consumer surplus increases by 17 dollars (compared to when the price was \$25 per bottle). What is the **willingness to pay (WTP)** for the 4th bottle of water?

   (A) \$24
   (B) \$22
   (C) \$20
   (D) \$17

   Solution. Answer: B
   Let's denote WTP for bottles as WTP_1, WTP_2, WTP_3, WTP_4. When $p = \$25$,

   $$\text{CS}_1 = \text{WTP}_1 + \text{WTP}_2 + \text{WTP}_3 - 75.$$

   When $p = \$20$,

   $$\text{CS}_2 = \text{WTP}_1 + \text{WTP}_2 + \text{WTP}_3 + \text{WTP}_4 - 80.$$

   We know $\text{CS}_2 - \text{CS}_1 = 17$, which implies

   $$\text{CS}_2 - \text{CS}_1 = \text{WTP}_4 - 5 = 17,$$

   so

   $$\text{WTP}_4 = 22.$$

3. In the cabbage market, researchers observed two equilibrium points at different times.

   Time 1: $(q_1, p_1) = (100, 50)$.
   Time 2: $(q_2, p_2) = (120, 40)$.

   Assume that both the supply and demand curves are linear. Which of the following statements is most accurate?

   (A) The supply of cabbage does not follow the law of supply.
   (B) The observed changes in price and quantity could result from a rightward shift in the demand curve, holding supply constant.
   (C) The demand curve is given by $q_D = 200 - 2p$.
   (D) We cannot determine the demand curve without additional assumptions.

Solution. Answer: D

- Demand and supply curves are based on **ceteris paribus**(其他條件不變) assumptions.
- Two equilibrium points alone cannot determine the specific form of demand or supply curves.

(A) We cannot conclude the cabbage supply curve violates the law of demand as the connection between these points may not represent either curve.
(B) If supply remains constant and demand shifts right, both equilibrium quantity and price will increase.
(C) To interpret the connection between these points as a demand curve, we must assume demand curve remains fixed while supply shifts right.

4. In each of the following circumstances, what would happen to the price and the quantity consumed of corn? Consider the following independent situations:

   i. The price of fertilizer (肥料) goes up.
   ii. The price of wheat (小麥), a substitute in consumption (消費上的替代品), goes up.
   iii. An epidemic (瘟疫) wipes out half the population.
   iv. The wages of industrial (工業) workers go up.

   How many of these situations would cause the supply curve to shift leftward? How many could cause the demand curve to shift leftward? (Assuming that corn is a normal good.)

   (A) $(1, 0)$
   (B) $(2, 0)$
   (C) $(1, 1)$
   (D) $(2, 1)$

Solution. Answer: D

- Fertilizer price increase:
  - Input cost increases
  - Supply curve shifts left
- Wheat price increase (consumption substitute):

  - Shifts demand curve right
  - No leftward demand shift
- Epidemic reducing population:
  - Shifts both supply and demand curves left
- Industrial(工業、不是農業) wage increase:
  - Workers' (also consumers') income increase.
  - Corn is normal good. Demand curve shift rightward.

Therefore, we conclude that supply shifts left twice, and demand shifts left once.

5. Fang opened a tea shop, running it alone, with a monthly revenue of \$62,000. If Fang did not open the shop, the highest monthly salary she could earn by working for a company would be \$35,000. The monthly rent for the equipment is \$25,000. Operating the tea shop requires money, so Fang withdrew her deposit (存款) from the bank for this purpose. If she had not withdrawn it, she would have earned \$3,000 in monthly interest(利息). What is the economic profit? Should Fang continue to operate the shop?

(A) −\$1000; No
(B) \$2000; Yes
(C) −\$3000; No
(D) \$34000; Yes

Solution. Answer: A
Based on the information given,

- Monthly revenue = \$62,000
- Accounting cost (equipment rental) = \$25,000
- Opportunity costs:
  - Foregone salary = \$35,000
  - Foregone interest = \$3,000

Economic profit calculation:

$$\begin{aligned}\text{Economic Profit} &= \text{Revenue} - \text{Accounting Cost} - \text{Opportunity Costs} \\ &= 62,000 - 25,000 - (35,000 + 3,000) \\ &= -\$1,000\end{aligned}$$

Hence, Fang should not continue operating the shop.

6. Given that the MC of a firm is represented by the equation:

$$\mathrm{MC}(q) = \frac{(q-3)^2}{2} + 1$$

Moreover, the MC curve intersects the AVC curve at $q = 4.5$, and the price of the good is \$3. Which of the following statements is most accurate?

(A) If the fixed cost of the firm is high enough, producing $q = 0$ can be the optimal choice.
(B) Choosing $q = 1$ and $q = 5$ both maximize profit.
(C) Choosing $q = 3$ maximizes profit.
(D) If the firm produces $q = 6$, the marginal profit is negative.

Solution. Answer: D
According to the problem, we know that MC and AVC intersect at $q = 4.5$, which is the minimum point of AVC. Furthermore, we know the price is \$3, and because the profit-maximizing output q^* must satisfy $\mathrm{MC}(q^*) = p$, therefore:

$$\mathrm{MC}(q^*) = \frac{(q^*-3)^2}{2} + 1 = 3,$$

solving yields:

$$q^* = 1 \quad \text{or} \quad q^* = 5.$$

(A) Since fixed costs have already been incurred, they cannot be recovered, making them sunk costs. Therefore, the firm's short-run decisions should not depend on the magnitude of fixed costs.
(B) Note that the first-order condition is only a sufficient condition, so we need to check which of $q = 1$ or $q = 5$ actually maximizes profit. Since we know the minimum point of AVC is at $q = 4.5$, we can conclude that producing at $q = 1$ cannot even cover variable costs, thus cannot maximize profit.
(C) Choosing $q = 5$ gives the firm higher profit than $q = 3$. This is because at $q = 3$, marginal revenue exceeds marginal cost as $\mathrm{MC}(3) = 1$.

7. Originally, there were 10000 cars crossing the Bay Bridge every day. In 2003, tolls (過路費) were raised by 3%. Economists found that the price elasticity of bridge-crossing demand is **inelastic**. Holding all else equal, choose the most accurate statement.

(A) The number of cars crossing the bridge did not change after the policy.

(B) The number of cars crossing the bridge per day decreased by more than 300.
(C) Raising the toll will increase the revenue collected by the local government.
(D) It's uncertain whether the revenue collected by the local government will increase or decrease.

Solution. Answer: C

(A) Quantity still decreases with price increase.
(B) Due to inelastic demand, the percentage decrease in quantity must be less than the percentage increase in price. Therefore, the reduction in quantity cannot exceed 300 cars.
(D) False: Revenue = Price × Quantity. Since demand is inelastic, the percentage increase in price exceeds the percentage decrease in quantity, thus total revenue must increase.

8. A factory emits smoke that harms its neighbor. The neighbor can eliminate this harm by installing an air purifier (空氣清淨機) for 10,000 dollars. Alternatively, the factory can reduce the smoke by installing a filter, which costs 15,000 dollars. If the neighbor has the legal right to be free from smoke and negotiating costs between the factory and the neighbor are very low, what will happen in the end according to Coase's Theory?

(A) The factory would install the filter itself.
(B) The factory would pay the neighbor 10,000 dollars to install the air purifier.
(C) The neighbor would pay 15,000 dollars to install the filter.
(D) Neither party would install anything.

Solution. Answer: B
By the information given, we know that

- Neighbor's air purifier cost = $10,000
- Factory's filter cost = $15,000
- Neighbor has legal right
- Low negotiation costs

By Coase's theory, resource allocation will be efficient regardless of initial property rights. Therefore, the lowest cost solution will be chosen. In this case, factory will pay neighbor $10,000 for purifier. Otherwise,

> factory needs to pay $15,000 for filter, which is more expensive than the neighbor's air purifier.