Principle of Economics: Homework 3, Unit 11 - Unit 20

Multiple Choice Questions

Choose the most appropriate answer for each question.

1. Suppose Phillip and Mathew are the only tenants in a building. The building owner is considering installing surveillance cameras. The following table shows their willingness to pay (WTP) for each additional camera.

# of Cameras	Phillip's WTP	Mathew's WTP
1	\$400	\$300
2	\$310	\$200
3	\$210	\$110
4	\$80	\$30

   If the cost of installing each surveillance camera is \$320, what is the socially optimal number of cameras to install?

   (A) 1
   (B) 2
   (C) 3
   (D) 4

> *Solution.* Answer: C
> To determine the socially optimal number of cameras, we need to find the maximum number of cameras where the marginal social benefit (sum of Phillip's and Mathew's WTP) equals or exceeds the marginal cost (\$320) of installing an additional camera. For each camera:
>
> $$\begin{aligned} \text{1st camera:} &\quad \$400 + \$300 = \$700 > \$320 \\ \text{2nd camera:} &\quad \$310 + \$200 = \$510 > \$320 \\ \text{3rd camera:} &\quad \$210 + \$110 = \$320 = \$320 \\ \text{4th camera:} &\quad \$80 + \$30 = \$110 < \$320 \end{aligned}$$
>
> Therefore, the socially optimal number is 3 cameras, as the total WTP for the fourth camera falls below the marginal cost of installation.

2. Which of the following statements is **true**?

   (A) A monopolist with market power necessarily earns positive economic profits.

(B) The IEPR implies that a monopolist should set higher prices in markets with more elastic demand.
(C) A monopolist's supply curve is equivalent to their marginal cost curve above the shutdown price.
(D) When a monopolist determines their profit-maximizing quantity, they simultaneously determine the market price.

Solution. Answer: D

(A) False. A monopolist with market power may earn zero economic profits. Earned economic profits depend on the monopolist's cost structure and the demand elasticity.
(B) False. The IEPR states that a monopolist should set higher prices in markets with less elastic demand.
(C) False. A monopolist does not have a supply curve because they are price setters.
(D) True. A monopolist determines their profit-maximizing quantity by equating marginal revenue and marginal cost. When the monopolist determines the profit-maximizing quantity, they determine the market price.

3. Three players live in a town and each can choose to contribute to fund a street lamp. The value of having the street lamp is 3 for each player and the value of not having one is 0. The Mayor asks each player to either contribute 1 or nothing. If at least two players contribute then the lamp will be erected. If one or less people contribute then the lamp will not be erected, in which case any person who contributed will not get their money back. Which of the following statements is **false**?

(A) No player has a dominant strategy.
(B) There are many pure-strategy Nash equilibria in this game.
(C) It is possible that all three players contribute to the fund in a Nash equilibrium.
(D) In this scenario, the street lamp is a public good.

Solution. Answer: C
Put yourself in the shoes of Player i. If you believe that both other players will not contribute to the fund, your best response is not to contribute. If you believe that one of the other players will contribute,

your best response is to contribute. If you believe that both other players will contribute, your best response is not to contribute. Hence, we can write down the best responses of each player:

$$\mathrm{BR}_i\left(s_j, s_k\right) = \begin{cases} 0 & \text{if } s_j = s_k, \\ 1 & \text{if } s_j \neq s_k, \end{cases}$$

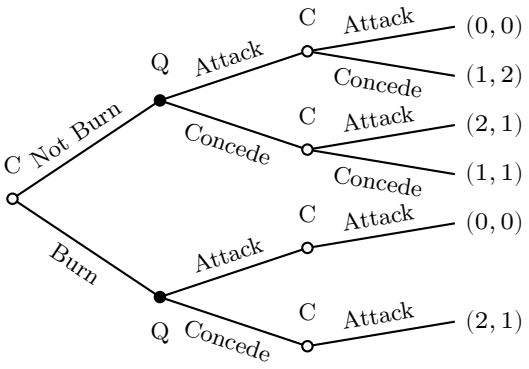
where s_j and s_k are the strategies of the other two players.

(A) True. No player has a dominant strategy because the best response of each player depends on the actions of the other players.
(B) True. There are many pure-strategy Nash equilibria in this game. Either the lamp being erected with two players contributing or the lamp not being erected with no player contributing can be supported as Nash equilibria.
(C) False. It is not possible for all three players to contribute to the fund in a Nash equilibrium. To see this, suppose that Player 1 and Player 2 contribute to the fund. Then, Player 3's best response is not to contribute.
(D) True. The street lamp is a public good because it is non-excludable and non-rivalrous.

4. The Battle of Julu (鉅鹿之戰) occurred during the uprising against the Qin Dynasty (秦朝). Consider an extensive-form game between Chu (楚) and Qin (秦) with the following structure:

   i. Chu first decides whether to burn their boats.
   ii. Qin, after observing Chu's decision, chooses to attack or concede.
   iii. Chu, after observing Qin's action, chooses to attack or concede. Notice that if Chu burns their boats initially, retreat becomes impossible.

   The payoff vector is denoted as (u_1, u_2), where u_1 and u_2 represent the payoffs for Chu and Qin respectively. Which of the following statements is **false**?



(A) If Chu does not burn their boats, Qin should choose to attack.
(B) To maximize their payoff, Chu should choose to burn their boats.
(C) The only Nash equilibrium is (Burn, Concede, Attack).
(D) Backward induction predicts that the outcome of this game is $(2, 1)$.

Solution. Answer: C

(A) True. When Chu preserves their boats (does not burn them), a rational Qin will choose to attack, knowing that Chu's optimal response will be to concede, resulting in a payoff of $(1, 2)$.
(B) Backward induction predicts that Chu's optimal strategy is to burn their boats, thereby committing to a position that maximizes their payoff.
(C) False. A complete description of Nash equilibria requires specifying both players' complete strategy profiles, including actions at every decision node.
(D) True. Using backward induction, we can predict that the equilibrium outcome of this game will yield payoffs of $(2, 1)$.

5. Which of the following statements is **true** regarding different market structures?

(A) In market structures with free entry and exit, economic profits will be driven to zero in the long run when firms have identical cost structures.
(B) Every firm faces a downward-sloping demand curve.
(C) All market structures except perfect competition can sustain positive economic profits in the long run.
(D) Perfect competition is the only market structure in which price equals marginal cost.

Solution. Answer: A

(A) True. In market structures with free entry and exit, the presence of positive economic profits attracts new entrants until profits are competed away to zero, given that firms have identical cost structures.

(B) False. Firms in perfect competition face perfectly elastic (horizontal) demand curves; only firms in monopolistic competition, oligopoly, and monopoly face downward-sloping demand curves.

(C) False. Monopolistic competition, like perfect competition, cannot sustain positive economic profits in the long run due to free entry and exit.

(D) False. In a Bertrand duopoly with identical cost structures, price competition drives the equilibrium price down to marginal cost, showing that perfect competition is not unique in this respect.

6. Consider a duopoly market with two firms, A and B, that produce identical products. They recognize that they will be playing this game over and over rather than just once. Which of the following statements about collusion is **false**?

   (A) Once firms form a cartel, they can sustain the collusive agreement as OPEC has done.

   (B) Collusion is more likely to be sustainable when the firms can easily detect deviations from the agreement.

   (C) A colluder who values future monopoly profits more than current cheating profits will abide by the collusive agreement.

   (D) If firms are patient enough, they can sustain a collusive agreement by threatening to punish deviations.

Solution. Answer: A

(A) False. Though OPEC is the world's most famous—and perhaps most successful—cartel, it has not been able to control oil prices over the past decade.

(B) True. Collusion is more likely to be sustainable when firms can easily detect deviations from the agreement. If firms cannot detect deviations, they will not be able decide whether to punish the deviator.

(C) True. A colluder who values future monopoly profits more than

current cheating profits will abide by the collusive agreement.

(D) True. If firms are patient enough, they can sustain a collusive agreement by threatening to punish deviations. If a firm doens't care about future profits, they will cheat and the collusive agreement will break down.

7. Marnie works at the guest check-in desk during nights at the hotel. She has the ability to determine how many hours she works each week. The hotel grants Marnie an increase in her hourly wage from $14 per hour to $20 per hour. How will Marnie respond?

   (A) Marnie will increase her hours worked if the income effect of the wage increase is positive.

   (B) Marnie will decrease her hours worked if the income effect of the wage increase is negative.

   (C) Marnie will not change her hours worked, as the income effect of the wage increase is zero.

   (D) We cannot determine how Marnie will respond without knowing her preferences.

Solution. Answer: A
Notice that the substitution effect(替代效果) of an increase in the return to working another hour, holding utility constant, will cause Marnie to want to work more hours. If the income effect(所得效果) of a wage increase is also positive, Marnie will increase her hours worked. (A) is correct.