

Self-Test 5 (KEY)

Strategic Competition

The tasks in this self-test are designed to be solvable by any student who has mastered the material. The answers provided are written instructionally to walk you through the problem-solving process for each task. A well-prepared student should score between 9 and 11 out of 12 without assistance from AI or others. A 12 out of 12 — without help — requires outlier performance or sheer luck. This self-test is optional, and your result will not count towards your grade. Direct any questions to your section's TA.

1. The market for tea kettles most likely belongs to which of the following market structures?
 - A. Perfect competition. *[Tea kettles are differentiated by design, material, and brand — not consistent with the homogeneous products assumption of perfect competition]*
 - B. Monopolistic competition.** *[The market has many sellers offering differentiated products with relatively low barriers to entry — the defining features of monopolistic competition]*
 - C. Oligopoly. *[While some premium brands are well-known, no small group of firms dominates the entire market with significant barriers to entry]*
 - D. Monopoly. *[No single firm controls the tea kettle market]*
2. Which of the following guarantees that a firm has market power?
 - A. Barriers prevent rival firms from entering the market. *[Barriers to entry can exist even in Bertrand competition, where firms still price at MC and have no market power]*
 - B. The market demand for the firm's product is downward sloping.** *[A downward-sloping demand curve means the firm can influence price setting $p > MC$, which is the definition of market power]*
 - C. The firm has positive short-run profit. *[A perfectly competitive firm can earn positive short-run profit while having no market power]*
 - D. The firm charges its profit-maximizing price. *[All firms, including perfectly competitive ones, charge their profit-maximizing price regardless of market power]*
 - E. All of the above.

Scenario 5.1: Firm 1 and Firm 2 serve a market with demand $p = 2,000 - 10Q$, where $Q = q_1 + q_2$ is the total quantity sold by the two firms. Each firm has fixed costs of \$4,000 and a constant marginal cost of \$200.

3. According to Scenario 5.1, how much will the profit per firm be if the two firms produce the perfectly competitive quantity?
 - A. Around -\$4,000.**
 - B. Around -\$2,000.
 - C. Zero.
 - D. Around \$2,000.
 - E. Around \$4,000.
 - F. Around \$6,000.

[At the PC quantity, $p = MC = \$200$. Each firm produces $q = 90$ units, earning revenue of $90 \times \$200 = \$18,000$. Variable cost = $90 \times \$200 = \$18,000$. Profit per firm = $\$18,000 - \$18,000 - \$4,000 = -\$4,000$]

4. According to Scenario 5.1, how much will the profit per firm be if the two firms compete in quantity?

- A. Around -\$4,000.
- B. Zero.
- C. Around \$16,000.
- D. Around \$32,000.**
- E. Around \$36,000.
- F. Around \$48,000.

[Each firm's best response: $MR_1 = MC \rightarrow 2,000 - 20q_1 - 10q_2 = 200 \rightarrow q_1 = 90 - q_2/2$. By symmetry $q_1 = q_2 = 60$. Market price: $p = 2,000 - 10 \cdot 120 = \800 . Profit per firm = $60 \cdot \$800 - 60 \cdot \$200 - \$4,000 = \$32,000$]

5. According to Scenario 5.1, how much will the profit per firm be if the two firms collude?

- A. Around -\$4,000.
- B. Zero.
- C. Around \$16,000.
- D. Around \$32,000.
- E. Around \$36,000.**
- F. Around \$48,000.

[Colluding firms act as a joint monopolist: $MR = MC \rightarrow 2,000 - 20Q = 200 \rightarrow Q = 90$, so each firm produces $q = 45$. Market price: $p = 2,000 - 10 \cdot 90 = \$1,100$. Profit per firm = $45 \cdot \$1,100 - 45 \cdot \$200 - \$4,000 = \$36,500$]

6. According to Scenario 5.1, the two firms agree to collude but Firm 2 cheats on the agreement while Firm 1 abides by it. Firm 2 knows that firm 1 will not cheat. Firm 1 does not know that firm 2 will cheat. How do the profits for the two firms compare to those from collusion?

- A. Firm 1 loses around \$5,000; Firm 2 gains around \$5,000.
- B. Firm 1 loses around \$5,000; Firm 2 gains around \$10,000.
- C. Firm 1 loses around \$10,000; Firm 2 gains around \$5,000.**
- D. Firm 1 loses around \$10,000; Firm 2 gains around \$10,000.

[Firm 2 knows that $q_1 = 45$. Maximizing its profit: $MR_2 = MC \rightarrow 2,000 - 20q_2 - 10 \cdot 45 = 200 \rightarrow q_2 = 67.5$. Market price: $p = 2,000 - 10 \cdot 112.5 = \875 .

Firm 1 profit = $45(\$875 - \$200) - \$4,000 = \$26,375$. Compared to collusion: $\$26,375 - \$36,500 = -\$10,125$.

Firm 2 profit = $67.5(\$875 - \$200) - \$4,000 = \$41,562.50$. Compared to collusion: $\$41,562.50 - \$36,500 = +\$5,062.50$]

7. According to Scenario 5.1, the two firms agree to collude but Firm 2 cheats on the agreement while Firm 1 abides by it. Firm 2 knows that firm 1 will not cheat. Firm 1 knows that firm 2 will cheat. How do the profits for the two firms compare to those from collusion?

- A. Firm 1 loses around \$9,000; Firm 2 gains around \$2,500.
- B. Firm 1 loses around \$9,000; Firm 2 loses around \$2,500.**
- C. Firm 1 loses around \$2,500; Firm 2 loses around \$9,000.
- D. Both firms lose around \$9,000.

[Firm 2 still believes $q_1 = 45$, so produces $q_2 = 67.5$. Firm 1 knows $q_2 = 67.5$ and optimizes: $MR_1 = MC \rightarrow 2,000 - 20q_1 - 10 \cdot 67.5 = 200 \rightarrow q_1 = 56.25$. Market price: $p = 2,000 - 10 \cdot 123.75 = \762.50 . Firm 1 profit = $56.25(\$762.50 - \$200) - \$4,000 = \$27,640.63$. Compared to collusion: $\$27,640.63 - \$36,500 = -\$8,859$. Firm 2 profit = $67.5(\$762.50 - \$200) - \$4,000 = \$33,968.75$. Compared to collusion: $\$33,968.75 - \$36,500 = -\$2,531$. This illustrates that information matters: once Firm 1 suspects Firm 2 will cheat and adjusts accordingly, Firm 2's expected gain from cheating turns into a loss]

8. If the firms in scenario 5.1 compete with respect to price, which of the following is most likely to happen in the long run?

- A. Both firms would exit the market.
- B. Both firms would stay in the market.
- C. One firm would eventually exit the market.**

[Under Bertrand competition with homogeneous goods, $p = MC = \$200$ and each firm earns $-\$4,000$. Since fixed costs cannot be covered, losses are unsustainable in the long run. One firm exits, and the surviving monopolist would have $MR = MC \rightarrow 2,000 - 20Q = 200 \rightarrow Q = 90$. Market price: $p = 2,000 - 10 \cdot 90 = \$1,100$. Profit = $90(\$1,100 - \$200) - \$4,000 = \$77,000$. Note here that we cannot tell which of the firms would exit — both have 50% chance]

9. Which of the following is most likely to avoid the Bertrand paradox?

- A. When sellers are obligated to maintain their initial prices for a very long time. *[The price rigidity hints non-repeated interaction. Firms cannot punish undercutting and cooperation cannot be sustained]*
- B. When products by different sellers are completely indistinguishable. *[Identical products make undercutting more effective, intensifying the paradox rather than avoiding it]*
- C. When the market is too large for any single seller to serve alone. [If a firm cannot serve the entire market due to capacity constraints, undercutting does not allow it to capture all customers — removing the incentive to undercut]**
- D. When there exist barriers to entry. *[Barriers prevent entry but do not affect the pricing dynamic between existing competitors]*

10. Which of the following hinders collusion in an oligopoly where firms compete in quantities?

- A. Cheating is profitable for the individual cheater. [When cheating improves the profit of the cheater, it will be harder for firms to stick to the collusion agreement]**
- B. Cheating is profitable for everyone. *[This could happen only if firms have colluded to erroneously fix the joint quantity below the monopoly level]*
- C. Cheating is profitable for no one. *[This could happen only when all firms are producing their Cournot quantity]*
- D. Colluding firms can immediately observe each other's output. *[Observability of output allows firms to detect and punish cheating quickly — this facilitates collusion rather than hindering it]*

11. If existing firms exit a market, which of the following is most likely to happen?
- A. The profits of remaining firms are likely to decrease. *[Exit reduces competition, allowing remaining firms to charge higher prices and earn higher profits]*
 - B. The market demand is likely to fall. *[Firm exit affects supply, not demand — market demand is determined by consumer preferences and income, not the number of sellers]*
 - C. The market supply is likely to increase. *[Fewer firms means less total supply — the market supply curve decreases]*
 - D. **The market price is likely to rise.** *[Exit reduces market supply, pushing the equilibrium price up]*
12. Which of the following is most likely to be true for a kinked-demand oligopoly?
- A. **Firms have established some kind of collusive agreement.** *[In the kinked demand model firms fear being undercut. Firms must already be above Cournot (i.e. at a collusive price) for this fear to make sense]*
 - B. Firms are looking forward to starting a price war. *[The kinked demand model explicitly assumes firms actively avoid price wars]*
 - C. A change in marginal cost will immediately affect pricing. *[The discontinuity in the MR curve means small changes in MC do not affect the profit-maximizing price]*
 - D. Rival firms have developed significant trust among each other. *[The model is built on mistrust — firms fear rivals will match price cuts but not price increases]*
 - E. None of the above.

Good afternoon! If you had a chance to take a red pill and automatically wake up on the morning of your graduation being able to receive the SMU Bachelor's degree without having to go through any classes and nobody would ever know about it, would you take it? What is the primary reason you enrolled in SMU, the degree or the knowledge? Have you ever really observed those around you who have already succeeded in whatever you want to succeed? What mattered more in their success: their knowledge and experiences or their titles? Why will an employer hire you: for your skillset or for your diplomas? Why will a potential client give you their business and money: just because you are a university graduate? Why will your friends appreciate your company: for your intellectual capacity or because you are an SMU alumnus? Think about all those questions. The answers may help you understand where you are heading in life. Kosmas

Please report any typos, mistakes, or suggestions for improvement to kmarinakis@smu.edu.sg.