

I. Multiple Choice

1. Which of the following best describes what it means for a firm to be a "price searcher" rather than a "price taker"?
 - A) The firm must search the market to find out what the going price is before it can sell
 - B) The firm faces a downward-sloping demand curve and must choose its price, trading off price against quantity sold
 - C) The firm sets its price equal to marginal cost in order to maximize profit
 - D) The firm accepts whatever price the market sets, since it has no influence over it
2. Which of the following is the key reason why marginal revenue is less than price for a monopolist?
 - A) The monopolist produces less output than a competitive firm, so it earns less revenue per unit
 - B) To sell one more unit, the monopolist must lower the price on all units sold, so the price effect partially offsets the output effect
 - C) The monopolist's average total cost is higher than in a competitive market, reducing revenue
 - D) Government regulation forces the monopolist to price below its profit-maximizing level
3. For a monopolist facing a linear demand curve $P = 100 - 2Q$, which of the following correctly states the marginal revenue curve?
 - A) $MR = 100 - 2Q$
 - B) $MR = 50 - 2Q$
 - C) $MR = 100 - 4Q$
 - D) $MR = 100 - Q$
4. A monopolist with demand $P = 80 - 2Q$ and marginal cost $MC = 20$ maximizes profit. What is the profit-maximizing quantity?
 - A) $Q = 10$
 - B) $Q = 15$
 - C) $Q = 20$
 - D) $Q = 30$
5. Using the same monopolist from Question 4 ($P = 80 - 2Q$, $MC = 20$), what is the profit-maximizing price?
 - A) $P = 20$
 - B) $P = 40$
 - C) $P = 50$
 - D) $P = 60$
6. A monopolist produces $Q^* = 10$ units, charges $P = \$50$, and has $ATC = \$35$ at that output. What is the monopolist's total economic profit?
 - A) \$15
 - B) \$150

- C) \$350
- D) \$500

7. Which of the following correctly describes allocative inefficiency under monopoly?
- A) The monopolist produces at a point where $P = MC$, leading to overproduction
 - B) The monopolist produces where $P > MC$, restricting output below the socially optimal level
 - C) The monopolist produces at minimum ATC, wasting productive resources
 - D) The monopolist charges a price below ATC, causing long-run losses
8. Deadweight loss under monopoly arises because:
- A) The monopolist earns economic profit, transferring surplus from consumers to producers
 - B) Units for which consumers' willingness to pay exceeds marginal cost are not produced
 - C) The monopolist produces too much output relative to the competitive equilibrium
 - D) The monopolist's ATC is higher than in a perfectly competitive market
9. Which of the following is a source of a natural monopoly?
- A) A firm obtains a government patent on a new drug
 - B) A firm gains exclusive control of a key natural resource
 - C) Economies of scale are so significant that one firm can supply the entire market at lower cost than multiple firms
 - D) The government grants a single firm an exclusive operating license
10. Under first-degree (perfect) price discrimination, which of the following is true?
- A) The monopolist produces less than a single-price monopolist, maximizing profit per unit
 - B) The monopolist produces the allocatively efficient quantity, but captures all surplus as producer surplus
 - C) Consumer surplus is maximized because every consumer pays their reservation price
 - D) Deadweight loss increases because the firm extracts more revenue from each consumer
11. Which of the following correctly compares a perfectly price-discriminating monopolist to a single-price monopolist?
- A) Both produce the same quantity and generate the same deadweight loss
 - B) The price-discriminating monopolist produces more output and eliminates deadweight loss, but consumer surplus falls to zero
 - C) The price-discriminating monopolist produces less output but earns higher profits per unit
 - D) The single-price monopolist is more allocatively efficient because it charges a uniform price
12. Which of the following is the defining characteristic of monopolistic competition that distinguishes it from perfect competition?
- A) There are very few firms and high barriers to entry
 - B) Firms produce differentiated products, giving each firm a small degree of market power
 - C) Each firm's pricing decisions depend on the strategic responses of rival firms
 - D) Firms earn positive economic profit in the long run due to brand loyalty

13. In the short run, a monopolistically competitive firm:
- A) Earns zero economic profit because of free entry
 - B) Produces where $P = MC$ because it behaves like a price taker
 - C) Behaves like a monopolist, producing at $MR = MC$ and setting price from the demand curve
 - D) Is productively efficient because it produces at minimum ATC
14. Which of the following correctly describes the long-run equilibrium in monopolistic competition?
- A) $P = MC = \min ATC$, achieving both allocative and productive efficiency
 - B) $P = ATC > MC$, with zero economic profit but persistent allocative and productive inefficiency
 - C) $P > ATC$, with positive economic profit maintained by product differentiation
 - D) $P = MC < ATC$, with firms earning losses and exiting the market
15. The excess capacity theorem in monopolistic competition states that:
- A) Firms hold excess inventory because they overproduce relative to consumer demand
 - B) Firms produce less than the output at minimum ATC, meaning productive resources are underutilized relative to the most efficient scale
 - C) Firms produce more than the socially optimal quantity because of product differentiation
 - D) Excess capacity arises only when firms collude to restrict output
16. In the long run, new firms enter a monopolistically competitive market when:
- A) Existing firms are earning zero economic profit and price equals ATC
 - B) Existing firms are earning positive economic profit, attracting entry that shifts individual demand curves leftward
 - C) Existing firms are incurring losses, making the market attractive to more efficient producers
 - D) The government removes price ceilings that had previously prevented entry
17. Which of the following is the defining characteristic of oligopoly that distinguishes it from all other market structures?
- A) Firms earn positive economic profit in the long run
 - B) Products are always identical, with no differentiation
 - C) Each firm's profit depends on the strategic decisions of rivals
 - D) There is a single dominant firm that sets prices for the entire industry
18. In the prisoner's dilemma payoff matrix from the handout, why do both firms end up at the Nash Equilibrium of (Price Low, Price Low) even though (Price High, Price High) gives both firms higher payoffs?
- A) Both firms incorrectly believe that Price High is the dominant strategy
 - B) Each firm's dominant strategy is to Price Low regardless of what the rival does, so both end up pricing low even though mutual cooperation would be better
 - C) The government forces both firms to price low to protect consumers
 - D) Both firms are irrational and fail to recognize that cooperation would improve their outcomes
19. A dominant strategy differs from a Nash Equilibrium in that:
- A) A dominant strategy requires both players to cooperate; a Nash Equilibrium does not

- B) A dominant strategy is the best response regardless of the rival's action; a Nash Equilibrium is a mutually consistent outcome that may not involve dominant strategies
 - C) A Nash Equilibrium always produces higher payoffs than a dominant strategy outcome
 - D) A dominant strategy only exists when firms collude; a Nash Equilibrium exists in all games
20. In the prisoner's dilemma, the Nash Equilibrium is socially suboptimal because:
- A) Both firms earn zero profit, wasting productive resources
 - B) Both firms should cooperate, but the incentive to defect makes the outcome unstable
 - C) The dominant strategy leads to a monopoly outcome that harms consumers
 - D) Government intervention is required to reach the Nash Equilibrium
21. Which of the following correctly describes the Bertrand model of oligopoly?
- A) Firms compete by setting quantities, so market is between monopoly and perfect competition
 - B) Firms compete by setting prices, and with identical products this drives price down to MC even with only two firms
 - C) Firms collude to set a joint profit-maximizing price, replicating the monopoly outcome
 - D) Firms set prices above MC but below the monopoly price, splitting the market equally
22. Which of the following correctly compares the Bertrand and Cournot models?
- A) Both models predict that price will equal marginal cost regardless of the number of firms
 - B) The Bertrand model predicts a competitive outcome with price equal to MC; the Cournot model predicts an outcome between monopoly and perfect competition
 - C) The Cournot model predicts a competitive outcome; the Bertrand model predicts a monopoly
 - D) Both models predict the monopoly outcome when there are only two firms
23. Which of the following best illustrates the concept of strategic interdependence in oligopoly?
- A) A firm sets its price equal to marginal cost because it cannot influence the market price
 - B) A firm raises its price after observing that its ATC has increased due to higher input costs
 - C) A firm considers how its rival will respond before deciding whether to launch advertising
 - D) A firm exits the market after earning negative economic profit for two consecutive quarters
24. Which of the following is true of collusion among oligopolists?
- A) Collusion is a Nash Equilibrium because no firm has an incentive to deviate from the set price
 - B) Collusion leads to competition among colluding firms, which drives prices down
 - C) Collusion can raise joint profits toward the monopoly level, but each individual firm has an incentive to cheat by undercutting the agreed price
 - D) Collusion is only possible when the government explicitly permits firms to coordinate pricing
25. According to the handout's comparison table, which of the following market structures achieves allocative efficiency in the long run?
- A) Monopolistic competition only
 - B) Oligopoly only
 - C) Perfect competition only
 - D) Both perfect competition and monopoly under price discrimination

26. Which of the following correctly describes productive efficiency and which market structure achieves it in the long run?
- A) Producing where $P = MC$; achieved in both perfect competition and monopoly
 - B) Producing at minimum ATC; achieved only in perfect competition in the long run
 - C) Producing where $MR = MC$; achieved in all market structures in the long run
 - D) Producing where $P = ATC$; achieved in both perfect competition and monopolistic competition
27. Which of the following market structures generates no deadweight loss in the long run?
- A) Monopoly with price discrimination
 - B) Monopolistic competition
 - C) Oligopoly with Cournot competition
 - D) Perfect competition
28. Joseph Schumpeter's concept of creative destruction suggests that:
- A) Monopoly is always harmful because it destroys consumer surplus through high prices
 - B) The static deadweight loss of monopoly is offset by the dynamic efficiency gains from innovation driven by the pursuit of monopoly profits
 - C) Oligopolists destroy competition through collusion, leading to permanent deadweight loss
 - D) Creative firms in monopolistic competition always replace inefficient monopolists over time
29. Which of the following correctly summarizes the long-run profit outcomes across market structures?
- A) All market structures earn zero economic profit in the long run due to free entry
 - B) Only monopoly and oligopoly can earn positive long-run economic profit; perfect competition and monopolistic competition earn zero
 - C) Only perfect competition earns positive long-run profit due to productive efficiency
 - D) All market structures earn positive economic profit in the long run if products are unique
30. A monopolistically competitive firm is said to have a "mini-monopoly" because:
- A) It is the only producer in the market and faces no competition from other firms
 - B) Product differentiation gives it a downward-sloping demand curve and some pricing power over its specific variety
 - C) It earns monopoly-level profits in the long run by preventing entry through branding
 - D) It produces at the same quantity as a monopolist and charges the same price
31. Which of the following correctly identifies the inefficiency present in monopolistic competition but absent in perfect competition?
- A) Firms earn positive economic profit, redistributing surplus from consumers to producers
 - B) Firms face downward-sloping demand curves, producing where $P > MC$ and less than minimum ATC
 - C) Firms collude to restrict output and raise prices above marginal cost
 - D) Barriers to entry prevent new firms from competing away profits over time

32. A firm in a monopolistically competitive market earns positive short-run profit. Which of the following best describes what happens in the long run?
- A) The firm raises its price to maintain profit as input costs rise
 - B) New firms enter, producing similar but differentiated products, shifting the firm's demand curve leftward until economic profit equals zero
 - C) The firm invests in capital to lower its ATC and maintain its profit advantage
 - D) The government regulates the firm's price down to marginal cost, eliminating the profit
33. Which of the following is true regarding barriers to entry across market structures?
- A) Monopolistic competition has the same high barriers as monopoly, which is why firms earn long-run profit
 - B) Perfect competition and monopolistic competition both have low or no barriers, which is why long-run economic profit is zero in both
 - C) Oligopoly has low barriers, allowing easy entry that drives profit to zero in the long run
 - D) Monopoly has moderate barriers, while oligopoly has the highest barriers of all markets
34. The price effect in the derivation of $MR < P$ refers to:
- A) The additional revenue earned from selling one more unit at the current price
 - B) The revenue lost on all previously sold units because price must be lowered to sell 1 more unit
 - C) The increase in price that occurs when the monopolist restricts output
 - D) The effect of a price ceiling on the monopolist's total revenue
35. Using the derivation in the appendix, if a monopolist faces demand $P = 60 - 3Q$, which of the following is the correct MR curve?
- A) $MR = 60 - 3Q$
 - B) $MR = 30 - 3Q$
 - C) $MR = 60 - 6Q$
 - D) $MR = 60 - 1.5Q$
36. A monopolist faces demand $P = 60 - 3Q$ and has $MC = 6$. Using $MR = MC$, what is the profit-maximizing quantity?
- A) $Q = 6$
 - B) $Q = 9$
 - C) $Q = 10$
 - D) $Q = 18$
37. Using the same monopolist from Question 36 ($P = 60 - 3Q$, $MC = 6$), what price does the monopolist charge at the profit-maximizing quantity?
- A) $P = 6$
 - B) $P = 33$
 - C) $P = 42$
 - D) $P = 54$

38. Which of the following correctly identifies the allocatively efficient output for the monopolist in Questions 36 and 37?
- A) $Q = 6$, where $MR = 0$
 - B) $Q = 9$, where $MR = MC$
 - C) $Q = 18$, where $P = MC$
 - D) $Q = 20$, where $P = ATC$
39. Which of the following is true about the relationship between the efficient output and the monopolist's profit-maximizing output?
- A) They are the same, because the monopolist sets $MR = MC$ which is also the condition $P = MC$
 - B) The efficient output is higher than the profit-maximizing output, because the monopolist restricts production to maintain a higher price
 - C) The efficient output is lower than the profit-maximizing output, because the monopolist overproduces to capture more consumer surplus
 - D) They differ only when the monopolist engages in price discrimination
40. Which of the following correctly describes the demand curve faced by a firm in each market structure?
- A) Perfectly elastic in perfect competition and monopoly; downward sloping in monopolistic competition and oligopoly
 - B) Perfectly elastic in perfect competition; downward sloping in monopoly, monopolistic competition, and oligopoly
 - C) Downward sloping in all four market structures, but steepest in monopoly
 - D) Identical across all market structures, since all firms face the same market demand

II. True or False

1. A monopolist's marginal revenue curve has the same vertical intercept as the demand curve but is twice as steep.
2. A monopolist maximizes profit by producing where $P = MC$.
3. Under perfect price discrimination, deadweight loss is eliminated and all surplus is captured by the monopolist as producer surplus.
4. In the long run, monopolistic competition results in positive economic profit because product differentiation prevents full entry.
5. The excess capacity theorem states that a monopolistically competitive firm produces more than the output at minimum ATC.
6. In the long run, both perfect competition and monopolistic competition result in zero economic profit.

7. The Nash Equilibrium in the prisoner's dilemma is the outcome where both firms collude to earn the highest joint profit.
8. A dominant strategy is one that yields the highest payoff if the rival also plays their dominant strategy.
9. The Bertrand model of oligopoly predicts that price competition between two firms with identical products drives price down to marginal cost.
10. The Cournot model predicts an outcome that is more competitive than the Bertrand model.
11. Oligopoly is characterized by the interdependence of firms, meaning each firm's profit depends on the strategic decisions of its rivals.
12. Perfect competition is the only market structure that achieves both allocative and productive efficiency in the long run.
13. A monopoly is always inefficient because it earns economic profit at the expense of consumers.
14. In monopolistic competition, the long-run tangency point between the demand curve and ATC occurs at the minimum of ATC.
15. Under monopoly, the firm produces on the elastic portion of its demand curve at the profit-maximizing output.

III. Fill in the Blank

1. A monopolist faces the market _____ curve. To sell more, it must lower its price, which means _____ is always less than price.
2. The rule for $MR < P$ can be decomposed into two effects: the _____ effect (revenue gained from the new unit) and the _____ effect (revenue lost on all previous units because price must fall).
3. For a linear demand curve $P = a - bQ$, the marginal revenue curve is $MR =$ _____, which has the same _____ as the demand curve but is _____ as steep.
4. A monopolist maximizes profit by producing where _____ = _____. It then sets price from the _____ curve.
5. The profit formula for a monopolist is: $\Pi = ($ _____ $-$ _____ $) \times$ _____.
6. A monopolist is allocatively inefficient because it produces where _____ $>$ _____, creating _____ loss.

7. Under first-degree price discrimination, the firm charges each consumer their _____, producing the allocatively _____ quantity. Consumer surplus equals _____.
8. Monopolistic competition combines _____ barriers to entry (like perfect competition) with _____ products (like monopoly), giving each firm a downward-sloping _____ curve.
9. In the long run in monopolistic competition, new firms _____, shifting existing firms' demand curves to the _____ until price equals _____ and economic profit equals _____.
10. The excess capacity theorem states that a monopolistically competitive firm produces _____ the output at minimum ATC. This gap is called _____ capacity.
11. The defining characteristic of oligopoly is _____: each firm's profit depends not only on its own actions but also on the _____ of its rivals.
12. A _____ strategy yields the highest payoff regardless of what the rival does. A _____ equilibrium is an outcome where no player has an incentive to unilaterally change their strategy.
13. In the prisoner's dilemma, the Nash Equilibrium is _____ for both players, even though the _____ outcome would make both better off. This illustrates the incentive to _____ on collusion.
14. The Bertrand model assumes firms compete on _____. With identical products, this drives price to _____, replicating the _____ outcome even with only two firms.
15. Schumpeter's concept of _____ describes how monopoly profits drive _____, which replaces old products and processes with new ones — a form of _____ efficiency not captured by static DWL analysis.

IV. Matching

Term	Definition
1. Nash Equilibrium	A. The difference between a firm's long-run output and the output at minimum ATC
2. Dominant strategy	B. A market with one seller, a unique product, and very high barriers to entry
3. Deadweight loss	C. An outcome where no player has an incentive to unilaterally change their strategy

4. Excess capacity	D. A strategy that yields the highest payoff regardless of what the rival does
5. Price discrimination	E. The triangle of lost surplus resulting from output restriction below the allocatively efficient level
6. Monopoly	F. The model of oligopoly in which firms compete by setting quantities, predicting an outcome between monopoly and perfect competition
7. Allocative efficiency	G. The practice of charging different consumers different prices based on their willingness to pay
8. Creative destruction	H. The condition $P = MC$, where the value consumers place on the last unit equals its cost
9. Cournot model	I. Schumpeter's idea that monopoly profits fuel innovation that replaces old products and processes
10. Productive efficiency	J. The condition where a firm produces at the minimum of its ATC curve

V. Short Answer

1. Explain in your own words why marginal revenue is less than price for a monopolist. Your answer should reference both the output effect and the price effect.
2. Explain the long-run adjustment process in monopolistic competition. Start from a position of short-run positive profit and describe the mechanism that drives the market to long-run equilibrium.
3. Distinguish between a dominant strategy and a Nash Equilibrium. Can a Nash Equilibrium exist when neither player has a dominant strategy? Explain.
4. Using the prisoner's dilemma framework from the handout, explain why collusion among oligopolists is inherently unstable. What makes the cooperative outcome difficult to sustain?
5. Compare the Bertrand and Cournot models of oligopoly. What does each model assume, what does each predict, and what does the difference between them tell us about the nature of competition?
6. Explain the excess capacity theorem in monopolistic competition. Why does excess capacity arise, and what are the trade-offs economists identify when evaluating it?
7. Explain Schumpeter's concept of creative destruction. How does it challenge the standard conclusion that monopoly is harmful to economic welfare?

8. Explain the difference between allocative efficiency and productive efficiency. For each type of efficiency, identify which market structures achieve it in the long run and why.

VI. Calculations

1. A monopolist faces the demand curve $P = 120 - 4Q$ and has a constant marginal cost $MC = 20$ and fixed costs of \$200.

- A) Derive the marginal revenue curve.
- B) Find the profit-maximizing quantity Q^* by setting $MR = MC$.
- C) Find the profit-maximizing price P^* .
- D) If ATC at Q^* equals \$40, calculate the monopolist's total economic profit.
- E) Identify the allocatively efficient quantity (where $P = MC$). How does it compare to Q^* ?

2. Using the same monopolist from Problem 1 ($P = 120 - 4Q$, $MC = 20$):

- A) Calculate the profit-maximizing quantity and price (you may use answers from Problem 1).
- B) Calculate the allocatively efficient quantity and price (where $P = MC$).
- C) The deadweight loss triangle has a base equal to the difference between the efficient and monopoly quantities, and a height equal to the difference between the monopoly price and MC. Calculate the area of the DWL triangle.
- D) Explain in one sentence what this deadweight loss represents in terms of lost surplus.

3. For each of the following demand curves, derive the marginal revenue curve and identify the profit-maximizing quantity given the stated marginal cost.

- A) $P = 90 - 3Q$, $MC = 30$
- B) $P = 50 - Q$, $MC = 10$
- C) $P = 200 - 5Q$, $MC = 50$

For each, also find the profit-maximizing price and state whether the firm is a price taker or price maker.

4. Two firms, X and Y, are deciding whether to advertise heavily or advertise lightly. The payoff matrix is as follows:

	Firm Y: Heavy	Firm Y: Light
Firm X: Heavy	(\$15, \$15)	(\$40, \$5)
Firm X: Light	(\$5, \$40)	(\$30, \$30)

- A) Identify Firm X's dominant strategy, if one exists. Show your reasoning by comparing payoffs.
- B) Identify Firm Y's dominant strategy, if one exists.
- C) Identify the Nash Equilibrium. Is it also the socially optimal outcome?
- D) Calculate the total joint profit at the Nash Equilibrium and at the cooperative outcome. What is the cost of non-cooperation in terms of total profit?
- E) Explain why the cooperative outcome (Light, Light) is unstable even if both firms agree to it.

5. A monopolistically competitive firm currently faces the demand curve $P = 80 - 2Q$ and has $ATC = 10 + 20/Q$ and $MC = 10$.

- A) Find the short-run profit-maximizing quantity and price using $MR = MC$.
- B) Calculate ATC at the profit-maximizing quantity.
- C) Calculate short-run economic profit.
- D) Explain what happens in the long run. Without recalculating a new equilibrium, describe the direction of adjustment and the condition that characterizes long-run equilibrium.

VII. Graphing

1. Draw a fully labeled monopoly diagram.

- Label the vertical axis "Price / Cost (\$)" and the horizontal axis "Quantity"
- Draw the downward-sloping demand curve (D) and correctly position the MR curve below it with the same vertical intercept
- Draw the MC and ATC curves
- Label Q^* (profit-maximizing quantity), P_m (profit-maximizing price), and ATC at Q^*
- Shade the profit rectangle
- Label the deadweight loss triangle and identify the allocatively efficient quantity where $P = MC$

2. Draw a monopoly diagram showing first-degree price discrimination.

- Draw the demand curve and MC curve
- Show that under perfect price discrimination, the MR curve effectively coincides with the demand curve
- Identify the quantity produced (compare it to the single-price monopoly quantity from Graph 1)
- Label the area representing producer surplus (which now equals total surplus)
- Indicate that consumer surplus equals zero and that deadweight loss is eliminated
- Add a brief annotation explaining why output is allocatively efficient under perfect price discrimination

3. Draw two side-by-side diagrams for a monopolistically competitive firm.

- In the left diagram (short run): show the firm earning positive economic profit — draw D, MR, MC, ATC, label Q^* and P^* , and shade the profit area
- In the right diagram (long run): show the long-run equilibrium where the demand curve is tangent to ATC — label Q_{LR} and P_{LR} , show that $P = ATC$, and mark the excess capacity as the gap between Q_{LR} and the output at minimum ATC
- Below both diagrams, write one sentence explaining the mechanism connecting the short run to the long run

4. Draw four small side-by-side diagrams, one for each market structure: perfect competition, monopolistic competition, oligopoly, and monopoly.

- For each, draw a representative firm's demand curve, MR, MC, and ATC

- Mark the equilibrium price and quantity
- Indicate whether $P = MC$ (allocative efficiency) and whether production occurs at minimum ATC (productive efficiency)
- Label DWL where it exists