
AP[®] Microeconomics

Free-Response Questions

Practice Set 3

Developed by APEconLabs

Original practice material modeled on the format of the AP Microeconomics exam. Section II — 3 free-response questions — suggested time 1 hour. A complete answer key and scoring guidelines are included at the end of this document.

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MICROECONOMICS SECTION II

TOTAL TIME — 1 HOUR · 3 QUESTIONS

Directions

Section II has 3 questions and lasts 1 hour. You may use the available paper for scratch work and planning, but you must write your answers in the free-response booklet. Label parts (e.g., A, B, C) and sub-parts (e.g., i, ii, iii) as needed. Use a pencil or a pen with black or dark blue ink to write your responses.

Include correctly labeled graphs, if useful or required, in explaining your answers. A correctly labeled graph must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to “Calculate,” you must show how you arrived at your final answer.

A calculator is allowed in this section.

You may pace yourself as you answer the questions in this section, or you may use these optional timing recommendations: spend the first 10 minutes reading all of the questions and planning your answers. Then spend about 25 minutes on Question 1 and about 12 minutes each on Questions 2 and 3.

You can go back and forth between questions in this section until time expires.

Note: This is original practice material developed by APEconLabs. It mirrors the structure and concept coverage of the AP Microeconomics free-response section and is intended for teacher and student use in the classroom.

1. Medivance Labs has a patent, a legal barrier to entry, on its newly developed allergy treatment that relieves common allergy symptoms. Medivance Labs is currently earning positive economic profit and is producing the profit-maximizing quantity of allergy treatments.
 - A. Draw a correctly labeled graph for Medivance Labs and show each of the following.
 - i. The profit-maximizing quantity of allergy treatments, labeled Q^*
 - ii. The profit-maximizing price, labeled P^*
 - iii. The average total cost curve consistent with positive economic profit, labeled ATC
 - iv. The area representing consumer surplus, shaded completely
 - B. Suppose Medivance Labs wants to charge a price that maximizes its total revenue rather than its profit.
 - i. On your graph in part A, show the revenue-maximizing quantity, labeled Q_R .
 - ii. At quantity Q_R identified in part B(i), is the demand for allergy treatments elastic, inelastic, or unit elastic?
 - C. Suppose now that Medivance Labs engages in perfect price discrimination.
 - i. On your graph in part A, show the lowest price that Medivance Labs would charge, labeled P_2 .
 - ii. What would happen to consumer surplus? Explain.
 - D. Suppose instead that Medivance Labs' patent expires. Will the demand for Medivance Labs' treatment become more elastic, become less elastic, or not change? Explain.

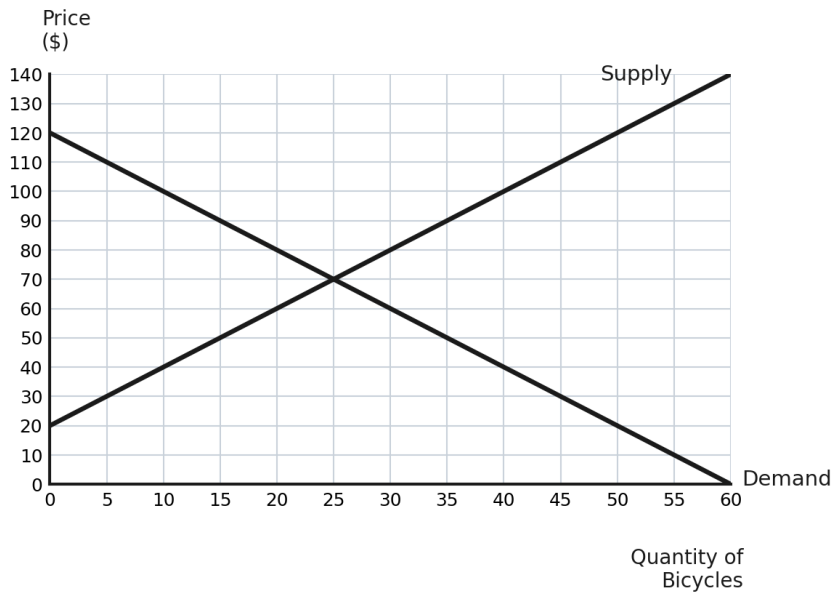
2. The table provided shows the short-run production function for Lumio Candles, a profit-maximizing firm that produces candles.

Number of Workers	Total Quantity of Candles
0	0
1	7
2	16
3	24
4	31
5	36
6	40
7	43
8	45
9	44

Lumio Candles sells as many candles as it wants at a market price of \$12 per candle and hires as many workers as it wants at a market wage of \$30.

- A. Lumio Candles' fixed cost is \$120. Calculate the average fixed cost if Lumio Candles hires 6 workers. Show your work.
- B. Assume labor is the only variable input to Lumio Candles. Calculate the marginal cost if Lumio Candles increases output from 31 to 36 candles. Show your work.
- C. With the hiring of which worker do diminishing marginal returns begin? Explain using numbers.
- D. Determine the profit-maximizing number of workers Lumio Candles will hire. Explain using marginal analysis.
- E. In the long run, a rival company, Glow Works, increases its production from 50 to 60 units, and its total cost increases from \$800 to \$1,200. Over the output range of 50 to 60 units, is Glow Works experiencing economies of scale, diseconomies of scale, or constant returns to scale? Explain using numbers.

3. Bicycles are produced in a perfectly competitive market that has no externalities. The provided graph shows the market supply and demand curves for bicycles in the country of Renland.



- A. Calculate total economic surplus at the market equilibrium. Show your work.
- B. To decrease the price of bicycles for consumers, the government of Renland has decided to set a price ceiling of \$50 per bicycle. Compared to the market equilibrium, will the quantity of bicycles purchased increase, decrease, or not change as a result of the price ceiling? Explain.
- C. Suppose instead the government of Renland provides a per-unit subsidy of \$20 to the sellers of bicycles.
- Identify the price paid by consumers per bicycle after the per-unit subsidy is implemented.
 - Calculate the total cost of the subsidy to the government. Show your work.
 - Does the per-unit subsidy cause deadweight loss to increase, decrease, or remain the same compared to the market equilibrium in part A? Explain.

STOP · END OF SECTION II

Answer Key & Scoring Guidelines

Practice Set 3

Model responses below indicate the economic reasoning and key terms expected for full credit. On the exam, correctly labeled graphs are required where a question asks students to “draw” or “show”; graph requirements are described in words here.

Question 1

- A.** On a monopoly graph, demand is downward sloping, marginal revenue (MR) lies below demand, marginal cost (MC) is upward sloping, and ATC is U-shaped.
- Q^* is the quantity where $MR = MC$.
 - P^* is read up from Q^* to the demand curve.
 - ATC is drawn below P^* at Q^* ($ATC < \text{price}$), consistent with positive economic profit.
 - Consumer surplus is the area below the demand curve and above the price P^* , from a quantity of 0 to Q^* .
- B.**
- Q_R , the revenue-maximizing quantity, is where marginal revenue equals zero ($MR = 0$). It is greater than Q^* .
 - At Q_R the demand for allergy treatments is unit elastic. Total revenue is maximized where $MR = 0$, which occurs at the unit-elastic point of the demand curve.
- C.**
- Under perfect price discrimination the firm produces where the demand curve intersects MC. The lowest price P_2 is the price on the demand curve at that quantity, equal to MC there.
 - Consumer surplus becomes zero. A perfectly price-discriminating monopolist charges each consumer the maximum that consumer is willing to pay, converting all consumer surplus into producer surplus.
- D.** Become more elastic. Once the patent expires, the legal barrier to entry is removed; competitors can enter with substitute treatments, giving consumers more alternatives and making demand for Medivance Labs' treatment more elastic.

Question 2

- A.** With 6 workers, total output = 40 candles. Average fixed cost = fixed cost \div quantity = $\$120 \div 40 = \3 .
- B.** Increasing output from 31 to 36 candles requires hiring one additional worker (the 5th) at the market wage of \$30. Marginal cost = change in total cost \div change in quantity = $\$30 \div (36 - 31) = \$30 \div 5 = \$6$.
- C.** Diminishing marginal returns begin with the 3rd worker. The marginal product of labor for workers 1 through 9 is 7, 9, 8, 7, 5, 4, 3, 2, and -1. Marginal product rises from 7 to 9 (the 2nd worker) and then falls to 8 with the 3rd worker, so diminishing marginal returns begin with the 3rd worker.
- D.** Lumio Candles will hire 7 workers. A firm hires workers as long as the marginal revenue product ($MRP = \text{marginal product} \times \12 price) is at least the \$30 wage. MRP by worker is \$84, \$108, \$96, \$84, \$60, \$48, \$36, \$24, and -\$12. The 7th worker's MRP (\$36) is greater than the \$30 wage, but the 8th worker's MRP (\$24) is less than \$30, so the firm hires 7 workers.
- E.** Diseconomies of scale. Average total cost at 50 units = $\$800 \div 50 = \16 ; at 60 units = $\$1,200 \div 60 = \20 . Because long-run average total cost rises (\$16 to \$20) as output increases, Glow Works is experiencing diseconomies of scale.

Question 3

- A.** At market equilibrium, quantity = 25 and price = \$70 (where supply equals demand). Consumer surplus = $\frac{1}{2} \times (\$120 - \$70) \times 25 = \$625$. Producer surplus = $\frac{1}{2} \times (\$70 - \$20) \times 25 = \$625$. Total economic surplus = $\$625 + \$625 = \$1,250$.
- B.** Decrease. The equilibrium price is \$70, so a price ceiling of \$50 is below equilibrium and is binding. At a price of \$50, quantity supplied = 15 (read from the supply curve), which is less than the equilibrium quantity of 25. Because the quantity actually traded is limited by the lower quantity supplied, the quantity of bicycles purchased decreases from 25 to 15.
- C.**
- With a \$20 per-unit subsidy to sellers, the new quantity is where demand equals the subsidized supply: quantity = 30, and the price paid by consumers falls to \$60 (sellers receive \$80).
 - Total cost of the subsidy = subsidy per unit \times quantity = $\$20 \times 30 = \600 .
 - Increase. At the original market equilibrium there was no deadweight loss because the market is efficient. The subsidy pushes output above the efficient quantity (from 25 to 30 units), creating deadweight loss of $\frac{1}{2} \times \$20 \times (30 - 25) = \50 , so deadweight loss increases.