AP | CollegeBoard

AP Microeconomics
Sample Student Responses
and Scoring Commentary

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Question 3

7 points (2 + 1 + 1 + 2 + 1)

(a) 2 points:

- One point is earned for correctly identifying the monopolist's profit-maximizing quantity, Q_3.
- One point is earned for correctly identifying the monopolist's profit-maximizing price, P_4.

(b) 1 point:

- One point is earned for stating that MSC > MPC **or** that the MSC curve exceeds, is above, or is greater than the MPC curve.

(c) 1 point:

- One point is earned for correctly identifying the socially optimal quantity, Q_3.

(d) 2 points:

- One point is earned for correctly identifying the dollar value of the tax, P_4–P_1.
- One point is earned for correctly identifying the profit-maximizing quantity associated with the tax, Q_2.

(e) 1 point:

- One point is earned for correctly stating that the deadweight loss increases because the monopolist's profit-maximizing quantity is equal to the socially optimal quantity before the tax and is less than the socially optimal quantity after the tax.

ANSWER PAGE FOR QUESTION 3

3.

a)

(i) Q_3

(ii) P_4

b) the marginal social cost exceeds marginal private costs, suggesting that there are spillover costs.

c) Q_3

d)

(i) $P_4 - P_1$

(ii) Q_2

e) The deadweight loss would increase. Already, (before the per-unit excise tax), the monopoly is producing at the socially optimal quantity; the imposition of the per-unit excise tax, however, shifts production quantity to Q_2, less than the socially optimal quantity of Q_3. Because the monopoly no longer produces at the socially optimal quantity, the deadweight loss would increase.

(actually produces less than the socially optimal quantity)

ANSWER PAGE FOR QUESTION 3

(a)

(i) Q_3

(ii) P_4

(b) Marginal social cost is less than marginal private cost

(c) Q_3

(d)

(i) Dollar value of tax = $P_4 - P_1$

(ii) Q_3

(e) Deadweight loss would increase because the tax will create a gap between the amount the suppliers produce and the amount that consumers pay.

ANSWER PAGE FOR QUESTION 3

(a)
(i) profit-maximizing quantity = Q_1
(ii) profit-maximizing price = P_2

(b) The graph indicates a negative externality because the marginal social cost is greater than the marginal private cost.

(c) socially optimal quantity = Q_3

(d)
(i) dollar value of tax = $P_2 - P_1$
(ii) profit maximizing quantity associated with ~~tax~~ tax = Q_1

(e) The deadweight loss would decrease as a result of the per-unit tax because it closes the gap between the marginal social cost and marginal private cost.

Question 3

Overview

The question assessed students' ability to use information on a given graph to identify the profit-maximizing quantity and price for a monopolist, identify why a negative externality exists, identify the socially optimal quantity with a negative externality, identify the size of the marginal external cost (which would be equal to the size of the per-unit tax), identify the quantity produced if a per-unit tax equal to the marginal external cost was imposed, and indicate what happens to the deadweight loss prior to and after the per-unit tax.

The question is based on a given graph, which illustrates a monopolist whose production of a good generates a negative externality. The graph consists of the marginal private cost (MPC), marginal social cost (MSC), marginal social benefit (MSB) and marginal revenue (MR) curves for the firm. Typically market failures are taught in isolation, separating the inefficiency of monopoly power, underproduction, from the inefficiency of a negative externality, overproduction. The graph shows that the profit-maximizing quantity for the monopolist where MR = MPC is equal to Q_3 and that the socially optimal quantity where MSC = MSB is equal to Q_3. Therefore, in the given graph, the inefficiency of market power, underproduction, is completely offset by the inefficiency of the negative externality, overproduction, which leads to no deadweight loss prior to government intervention. The resulting per-unit tax, which is required to correct for a negative externality in a perfectly competitive market, leads to an increase in deadweight loss in the context of the monopoly market.

In part (a), students were required to recognize that: (1) a monopolist's profit-maximizing quantity occurs where the marginal private cost equals the marginal revenue and (2) the profit-maximizing monopolist charges a price equal to the maximum price consumers are willing to pay for that quantity. In part (b) students were asked to use information from the graph to verify that the firm's production created a negative externality. Part (c) tested whether students understood that the socially optimal quantity occurs where marginal social cost equals marginal social benefit. In part (d) students were asked to: (1) identify the dollar value of a per-unit tax that aligns marginal private costs with marginal social costs and (2) determine the firm's profit-maximizing quantity given the per-unit tax. Finally, part (e) tested whether students understood that monopoly power may offset a negative externality and that a per-unit tax may create or increase deadweight loss rather than eliminate it.

Sample: 3A
Score: 7

The student answers all parts of the question correctly and earned all 7 points.

Sample: 3B
Score: 4

The student did not earn 1 point in part (b) because the response incorrectly states that marginal social cost is less than marginal private cost. The student did not earn 1 point in part (d)(ii) because the response does not state the correct profit-maximizing quantity. The student did not earn 1 point in part (e) because the response incorrectly states that deadweight loss increases because there is a gap between the amount the suppliers produce (a quantity) and the amount that consumers pay (a price). **Note**: The monopolist's profit-maximizing quantity is Q_2, which is less than the socially optimal quantity before the tax, Q_3, resulting in a deadweight loss.

Sample: 3C
Score: 2

The student earned 1 point in part (b) for correctly stating that marginal social cost is greater than the marginal private cost. The student earned 1 point in part (c) for stating the correct socially optimal quantity.