

Week 27

AP Microeconomics

Homework bundle for this week

本周作业合集

exercises.lol

Contents 目录

Topic 6 quiz	2
Exercise sheet 6.1	5
Past-paper questions 6.1	8
Exercise sheet 6.2	20
Past-paper questions 6.2	24
Exercise sheet 6.3	32
Exercise sheet 6.4	35
Past-paper questions 6.4	39
Exercise sheet 6.5	51

6. Market Failure and the Role of Government

Starter Quiz · 课前小测

AP Microeconomics

Name: _____ Score: _____

1. A market is socially efficient at the quantity where:
 - ☐ marginal social benefit equals marginal social cost
 - ☐ total revenue is highest
 - ☐ price is highest
 - ☐ marginal cost is zero
2. An externality is a cost or benefit that falls on:
 - ☐ a third party outside the transaction
 - ☐ only the buyer
 - ☐ only the seller
 - ☐ the government only
3. A good is "rival" when:
 - ☐ one person's use uses it up for others
 - ☐ non-payers can be excluded
 - ☐ it is free to make
 - ☐ the government provides it
4. Marginal-cost pricing ($P = MC$) of a natural monopoly gives the efficient quantity but often:
 - ☐ forces the firm to make a loss
 - ☐ gives the firm a huge profit
 - ☐ causes a shortage
 - ☐ raises the price above demand
5. Which is usually more unequal?
 - ☐ wealth (total assets owned)
 - ☐ income (yearly earnings)
 - ☐ they are always equal
 - ☐ neither shows inequality
6. At the socially efficient quantity, total surplus is as large as possible.
 - ☐ True ☐ False

7. When a market cannot reach the efficient quantity on its own, we call it a market _____.

8. A good with a positive externality (like vaccination) is underproduced by the market.

☐ True ☐ False

9. When everyone waits for someone else to pay for a public good, it is the _____-rider problem.

10. Policy that blocks mergers to keep markets competitive is called _____ policy.

6. Market Failure and the Role of Government

Answers · 答案

AP Microeconomics

1. **marginal social benefit equals marginal social cost**

At $MSB = MSC$ total surplus is maximised — the efficient quantity.

2. **a third party outside the transaction**

The spillover lands on someone outside the buyer-seller deal.

3. **one person's use uses it up for others**

Rivalry is about using it up; excludability is about keeping non-payers out.

4. **forces the firm to make a loss**

A natural monopoly's average cost sits above marginal cost, so $P = MC$ is below ATC — a loss.

5. **wealth (total assets owned)**

Wealth (accumulated assets) is typically distributed far more unequally than yearly income.

6. **True**

Making more or less than $MSB = MSC$ would shrink total surplus.

7. **failure**

A market failure leaves a deadweight loss and may justify government action.

8. **True**

Buyers ignore the benefit to others, so the market makes too little.

9. **free**

The free-rider problem leaves public goods underprovided, so the government steps in.

10. **antitrust**

Antitrust policy limits the build-up of market power.

6.1 Socially Efficient and Inefficient Market Outcomes

Name: _____ Class: _____ Date: _____ Total: 9 marks

KEY WORDS market failure 市场失灵 • socially efficient 社会效率 • public good 公共物品

Objective

Build the skills to answer exam questions on **socially efficient and inefficient market outcomes**.

You must be able to:

- explain that a market is **socially efficient** 社会效率 when **marginal social benefit** equals **marginal social cost**
- relate the efficient outcome to the maximization of **total surplus**
- explain how **market power** leads to underproduction and a **deadweight loss**
- define **market failure** 市场失灵

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Social efficiency

A market is socially efficient where **marginal social benefit (MSB) = marginal social cost (MSC)** — this maximizes **total surplus**.

■ Market power

A firm with market power **underproduces** (produces where $P > MC$), so some mutually beneficial units are lost — a **deadweight loss**.

■ Market failure

Any outcome in which a market **fails to allocate resources efficiently** (from market power, externalities, public goods, and so on).

2 Practice

2.1 State the condition for a socially efficient market outcome. [1]

2.2 Define market failure. [1]

2.3 Explain how market power leads to a deadweight loss. [2]

3 Exam-style questions

3.1 A market is socially efficient where [1]

- A $MSB > MSC$
- B $MSB = MSC$
- C $MSB < MSC$
- D the price is zero

3.2 Market failure is when a market [1]

- A maximizes total surplus
- B fails to allocate resources efficiently
- C is perfectly competitive
- D has no firms

3.3 A monopoly restricts output below the efficient level.

(a) State the effect on total surplus. [1]

(b) Name the loss this creates. [1]

(c) State whether this is a market failure. [1]

Solutions

2.1 where marginal social benefit equals marginal social cost.

2.2 an outcome in which the market fails to allocate resources efficiently.

2.3 market power leads to producing where $P > MC$ (underproduction), so some beneficial trades are lost — a deadweight loss.

3.1 B.

3.2 B.

3.3 (a) it falls. (b) a deadweight loss. (c) yes.

Name:

AP Microeconomics: 2026

- 1.** Feram and Ocel are the only two steel manufacturers in the region. Feram is deciding whether to transport its steel with Truck or Rail. Ocel is deciding whether to produce its steel as Sheets or Beams. The payoff matrix shows the payoffs for each combination of strategies. The first entry in each cell shows Feram's profit, and the second entry shows Ocel's profit. Each firm independently and simultaneously chooses its strategy. Assume that Feram and Ocel know all the information in the matrix and do not cooperate.

		Ocel	
		Sheets	Beams
Feram	Truck	\$40 million, \$95 million	\$20 million, \$125 million
	Rail	\$50 million, \$75 million	\$30 million, \$25 million

Part A

What is Feram's most profitable strategy if Ocel chooses to produce Sheets?

Part B

Does Ocel have a dominant strategy? Explain using numbers from the payoff matrix.

Part C

Identify the Nash equilibrium (or equilibria) for this game, or state that none exists.

Part D

Suppose Feram incurs a \$20 million increase in the cost of Rail transport, with no change in the cost of Truck transport. Redraw the payoff matrix, including the firms, strategies, and payoffs, showing how the \$20 million increase in the cost of Rail transport affects the payoff matrix.

Part E

Suppose instead that Feram and Ocel now cooperate and merge into one new firm, Acier, which is now the only producer of steel in the region. Acier produces the profit-maximizing quantity of steel and is earning positive economic profit. Draw a correctly labeled graph for Acier, and show each of the following.

- Acier's profit-maximizing quantity, labeled Q_1
- Acier's profit-maximizing price, labeled P_1
- The average total cost curve, labeled ATC, consistent with Acier earning positive economic profit
- The area of deadweight loss, shaded completely

Part F

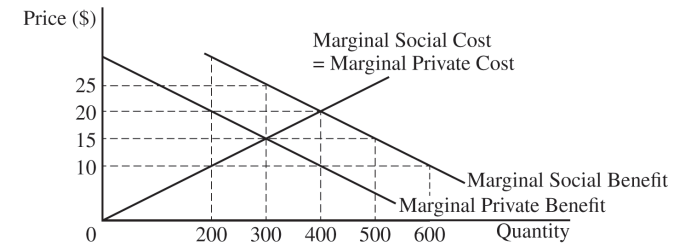
Government regulators impose a lump-sum tax on Acier. In the short run, will Acier's profit-maximizing price of steel increase, decrease, or remain the same as a result of the lump-sum tax? Explain.

1. Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

A. Draw a correctly labeled graph for Voda Reservoir and show each of the following.

- The profit-maximizing quantity, labeled Q_M
 - The profit-maximizing price, labeled P_M
 - The average total cost curve consistent with Voda Reservoir earning negative economic profit, labeled ATC
 - The area of deadweight loss, shaded completely
- B. Suppose the government requires Voda Reservoir to produce the socially optimal quantity of bottled water. On your graph in part A, show the socially optimal quantity of bottled water, labeled Q_S .
- C. Suppose instead the government grants a per-unit subsidy to Voda Reservoir. What will happen to Voda Reservoir's profit-maximizing quantity of bottled water? Explain.
- D. Suppose new producers have entered the bottled-water market and Voda Reservoir continues to operate in the bottled-water market. Will the demand for Voda Reservoir's bottled water become more elastic, become less elastic, or stay the same as new producers enter the market?
- E. Voda Reservoir hires workers in a perfectly competitive labor market.
- If the demand for bottled water increases, what will happen to Voda Reservoir's demand for labor? Explain.
 - The government implements a new regulation that increases the minimum age required for a worker to be employed in a bottled-water factory. What will happen to the market wage in the short run? Explain.

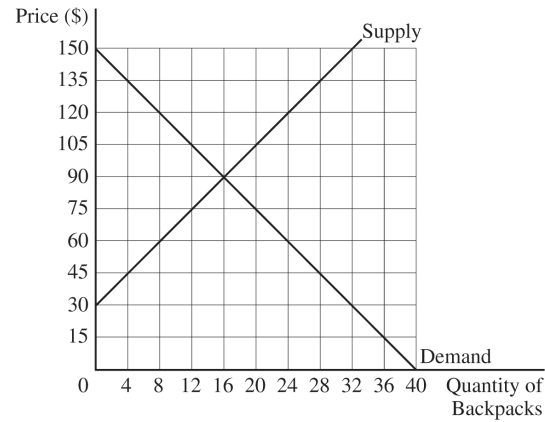
2. Good X is produced and sold in a perfectly competitive market. The provided graph shows the market for Good X.



- Identify the market equilibrium price and quantity.
- Calculate the deadweight loss at the market equilibrium. Show your work.
- Suppose the government wants to eliminate the deadweight loss in the market for Good X.
 - Which of the following will achieve the government's objective: a per-unit tax on consumers or a per-unit subsidy to consumers? Explain.
 - What is the dollar value of the per-unit tax or per-unit subsidy identified in part (c)(i) ?
- Suppose instead the government imposes a price ceiling of \$10. Will the price ceiling achieve the socially optimal quantity of Good X? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

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

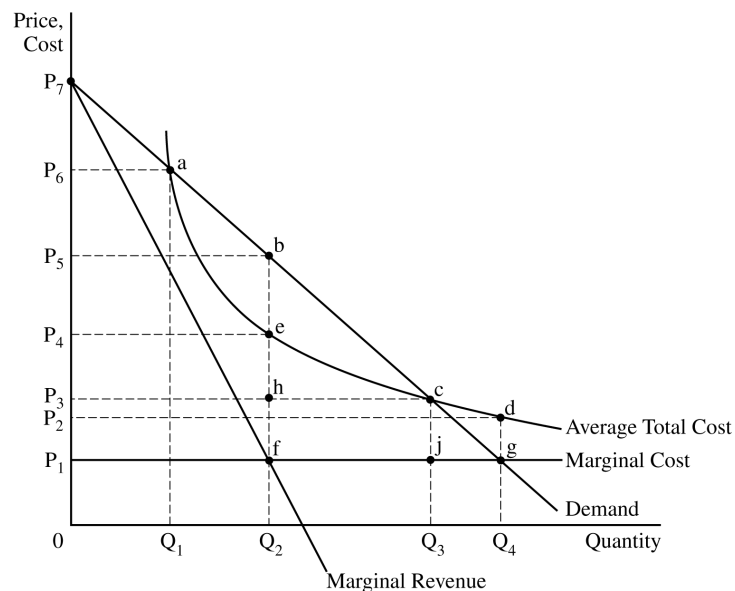


- (a) Calculate total economic surplus at the market equilibrium. Show your work.
- (b) To decrease the price of backpacks for students, the government of Jambo has decided to set a price ceiling of \$60 per backpack. Compared to the market equilibrium, will the quantity of backpacks purchased increase, decrease, or not change as a result of the price ceiling? Explain.
- (c) Suppose instead the government of Jambo provides a per-unit subsidy of \$30 to the sellers of backpacks.
- Identify the price paid by consumers per backpack 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.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

STOP

END OF EXAM



3. The graph shows the cost and revenue curves for an unregulated, profit-maximizing monopoly.

- Is the firm shown in this graph a natural monopoly? Explain.
- Using the labeling from the graph, identify the area representing the deadweight loss for this profit-maximizing monopoly.
- In order to improve resource allocation, the government sets a price that results in the firm earning zero economic profit.
 - Using the labeling from the graph, identify the price and resulting quantity the firm would produce.
 - Will this government policy eliminate the deadweight loss? Explain using labeling from the graph.
- Instead, the government decides to set a price that results in the socially optimal quantity of output. Will the firm earn positive, negative, or zero economic profit? Explain using labeling from the graph.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

STOP

END OF EXAM

1. The government of an island nation grants SkyRunner Airlines exclusive monopoly rights to serve the island. SkyRunner is earning positive economic profits.

(a) Draw a correctly labeled graph for SkyRunner, and show each of the following.

- The profit-maximizing quantity of tickets, labeled Q_M
- The profit-maximizing price of a ticket, labeled P_M
- The area representing profits, shaded completely

Now the island's tourist bureau asks the government to consider the following two proposals.

- Proposal I: Set a price ceiling on tickets that eliminates all deadweight loss.
- Proposal II: Eliminate SkyRunner's monopoly rights, which will remove all barriers to entry.

(b) Suppose the government adopts proposal I. On your graph in part (a), indicate the quantity of tickets sold in the short run, labeled Q_C .

(c) Suppose instead the government adopts proposal II. How will each of the following be affected in the long run compared to the market conditions in part (a) ?

- The quantity of tickets sold by SkyRunner. Explain.
- The price elasticity of demand for SkyRunner's airline service. Explain.
- SkyRunner's profits
- The deadweight loss in the market. Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

1. NCHart is a corporation that has developed and patented a new drug to treat heart disease. There are no substitutes for this drug, giving NCHart a monopoly.

(a) Draw a correctly labeled graph of NCHart making a positive economic profit, and show each of the following.

- (i) The profit-maximizing quantity, labeled Q_m
- (ii) The profit-maximizing price, labeled P_m

(b) At Q_m from part (a)(i), is demand elastic, unit elastic, or inelastic? Explain using information from the graph.

(c) Instead of maximizing profit, suppose NCHart considers providing the new drug to as many patients as possible as long as it can generate enough revenue to cover its total costs.

- (i) On your graph from part (a), show the quantity that is consistent with this goal, labeled Q_z .
- (ii) At Q_z from part (c)(i), is there a deadweight loss? Explain.

(d) NCHart's patent expires next year, and a new firm, TXDrug, is considering whether to Enter this market or Stay Out. NCHart can either produce Q_m or Q_z . The firms independently and simultaneously choose their actions. The first entry in the payoff matrix represents NCHart's payoff and the second entry represents TXDrug's payoff. Both firms have complete information. Use the payoff matrix below to answer the following questions.

		TXDrug	
		Stay Out	Enter
NCHart	Q_m	\$10, \$0	\$4, \$1
	Q_z	\$0, \$0	-\$2, -\$1

- (i) Does TXDrug have a dominant strategy? Explain using strategies and payoffs from the payoff matrix.
- (ii) What is the best response for NCHart if TXDrug chooses to Stay Out?
- (iii) Identify the Nash equilibrium.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Copper is produced in a perfectly competitive market with an upward-sloping supply curve and a downward-sloping demand curve. Assume the production of copper results in liquid waste, which seeps into local rivers. The contaminated river water causes human illnesses and crop failures downstream. The marginal external cost from producing copper is constant across all quantities of copper produced.

(a) Draw a correctly labeled graph of the copper market with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.

- (i) The market equilibrium quantity, labeled Q_M
- (ii) The socially efficient quantity, labeled Q_S

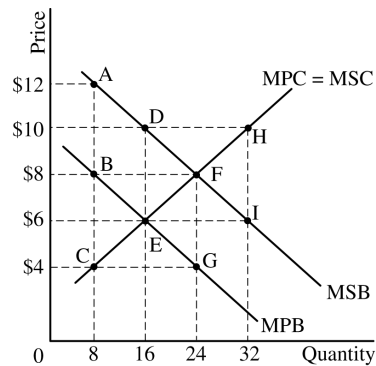
(b) Suppose the demand for copper decreases. On your graph in part (a), show the deadweight loss at the new market equilibrium, shaded completely.

(c) Suppose the government is considering levying a tax on copper.

- (i) What per-unit tax level would achieve the socially optimal quantity?
- (ii) Explain why a lump-sum tax on producers will not achieve the socially optimal quantity in the short run.

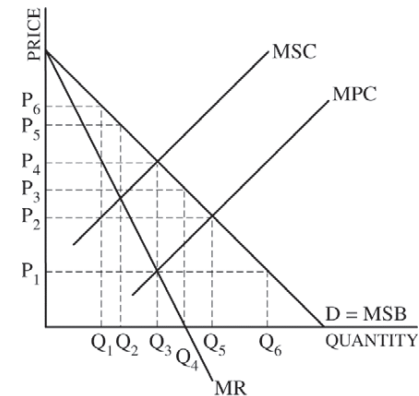
Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Modern-day word processing software gives consumers the ability to create and save documents in different file formats that can then be accessed by multiple computer operating systems. The graph below depicts a perfectly competitive market for word processing software. In the graph, MSB is the marginal social benefit, MPB is the marginal private benefit, MPC is the marginal private cost, and MSC is the marginal social cost.



- Identify the type of market failure illustrated by the graph. Explain.
- Using the numbers on the graph, identify the market equilibrium price and quantity.
- Using the labeling on the graph, identify the area representing the deadweight loss at the quantity identified in part (b).
- Suppose the government is considering granting a subsidy to correct the market failure. What is the dollar value of the per-unit subsidy that would achieve the socially optimal quantity?
- Suppose the government does not grant the subsidy and instead imposes a price floor at \$8.
 - How many units will consumers and producers exchange at the price floor?
 - Does the price floor correct the market failure? Explain.

3. The graph below shows the marginal social cost (MSC), marginal private cost (MPC), marginal social benefit (MSB), demand (D), and marginal revenue (MR) curves for a monopoly.



- Identify the monopolist's
 - profit-maximizing quantity
 - profit-maximizing price
- What information in the graph indicates that there is a negative externality?
- Identify the socially optimal quantity.
- In the case in which the government imposes a per-unit tax equal to the marginal external cost, identify each of the following.
 - The dollar value of the tax, using the price labels from the graph
 - The profit-maximizing quantity associated with the tax
- Given the monopoly facing the negative externality, would the deadweight loss increase, decrease, or stay the same as a result of imposing the per-unit tax? Explain.

STOP

END OF EXAM

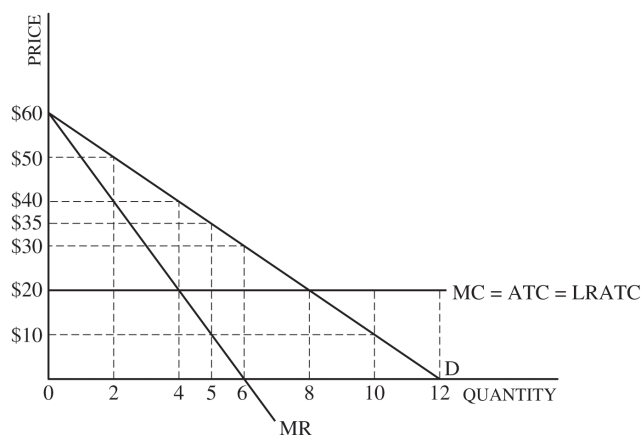
MICROECONOMICS
Section II

Planning time—10 minutes

Writing time—50 minutes

Directions: You have 10 minutes to read all of the questions in this booklet, to sketch graphs, to make notes, and to plan your answers. You will then have 50 minutes to answer all three of the following questions. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. In answering the questions, you should emphasize the line of reasoning that generated your results; it is not enough to list the results of your analysis. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. The graph below shows the demand curve (D), marginal revenue curve (MR), marginal cost curve (MC), average total cost curve (ATC), and long-run average total cost curve (LRATC) for a monopolist.



- (a) Using the numbers given in the graph, identify each of the following for the profit-maximizing monopolist.
- The quantity produced
 - The price
 - The allocatively efficient quantity
- (b) At the profit-maximizing quantity from part (a)(i), is the monopolist experiencing economies of scale? Explain.

AP MICROECONOMICS • EXERCISE SHEET

6.2 Externalities

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS externality 外部性 • negative externality 负外部性 • pigouvian tax 庇古税
• positive externality 正外部性 • socially efficient 社会有效率

Objective

Build the skills to answer exam questions on **externalities**.

You must be able to:

- define an **externality** 外部性 as a cost or benefit on a third party
- distinguish a **negative externality** 负外部性 from a **positive externality** 正外部性
- show how a negative externality causes **overproduction** and a positive one **underproduction**
- evaluate corrective policies: a **Pigouvian tax** 庇古税, a subsidy, and tradable permits

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Externalities

A **cost or benefit** that falls on a third party outside a market transaction.

- Negative** (e.g. pollution): marginal social cost exceeds private cost → the market **overproduces**.
- Positive** (e.g. vaccination): marginal social benefit exceeds private benefit → the market **underproduces**.

Either way there is a **deadweight loss** compared with the socially efficient outcome.

■ Corrective policy

A **Pigouvian tax** on a negative externality, a **subsidy** for a positive one, or **tradable permits**.

2 Practice

2.1 Define an externality. [1]

2.2 State whether a negative externality causes over- or under-production. [1]

2.3 Name a policy to correct a negative externality. [1]

3 Exam-style questions

3.1 A negative externality causes the market to [1]

- A underproduce
 - B overproduce
 - C produce the efficient amount
 - D stop producing
-

3.2 A tax set equal to the external cost of a good is called a [1]

- A tariff
 - B Pigouvian tax
 - C subsidy
 - D quota
-

3.3 A factory pollutes a river, harming nearby residents.

(a) Name the type of externality. [1]

(b) State whether the market over- or under-produces. [1]

(c) Name a corrective policy. [1]

Solutions

2.1 a cost or benefit that falls on a third party outside the transaction.

2.2 overproduction.

2.3 a Pigouvian tax (or tradable permits).

3.1 B.

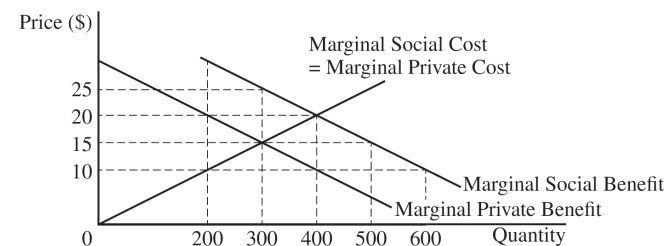
3.2 B.

3.3 (a) a negative externality. (b) it overproduces. (c) a Pigouvian tax (or tradable permits).

Name: _____

AP Microeconomics: **2024 Set 1**

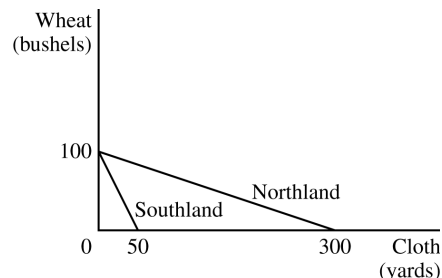
2. Good X is produced and sold in a perfectly competitive market. The provided graph shows the market for Good X.



- (a) Identify the market equilibrium price and quantity.
- (b) Calculate the deadweight loss at the market equilibrium. Show your work.
- (c) Suppose the government wants to eliminate the deadweight loss in the market for Good X.
- (i) Which of the following will achieve the government's objective: a per-unit tax on consumers or a per-unit subsidy to consumers? Explain.
- (ii) What is the dollar value of the per-unit tax or per-unit subsidy identified in part (c)(i) ?
- (d) Suppose instead the government imposes a price ceiling of \$10. Will the price ceiling achieve the socially optimal quantity of Good X? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. The graph shows the production possibilities curves for Northland and Southland.



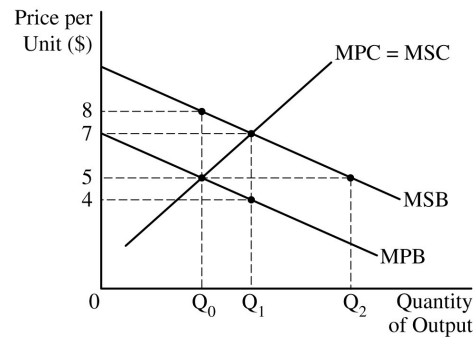
- Which country has a comparative advantage in producing wheat? Explain using numbers.
- Identify a specific number of yards of cloth that could be traded for 10 bushels of wheat and would be mutually beneficial to Northland and Southland.
- Southland's maximum possible output of wheat falls from 100 bushels to 75 bushels. Assuming no other changes, will Southland have a comparative advantage in producing cloth? Explain using numbers.
- Turnips are produced in a perfectly competitive market in Alderia, a third country, which does not engage in international trade. Runoff from turnip fields pollutes Alderia's rivers, hurting its residents.
 - Does the turnip market equilibrium result in an efficient allocation of resources? Explain using marginal analysis.
 - In an effort to reduce pollution, Alderia's government imposes a lump-sum tax on turnip production. What will be the impact on the turnip market equilibrium price and quantity in the short run?

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

- Anderson Company is a typical firm that manufactures Good G in a constant-cost, perfectly competitive market. Anderson Company is currently earning positive economic profit.
 - What must be true about the relationship between accounting profit and economic profit if Anderson Company currently incurs both explicit and implicit costs in production?
 - Draw correctly labeled side-by-side graphs for the market and Anderson Company and show each of the following.
 - The market equilibrium price and quantity, labeled P_M and Q_M , respectively
 - The profit-maximizing price and quantity for Anderson Company, labeled P_F and Q_F , respectively
 - The area representing Anderson Company's positive economic profit, shaded completely
 - On your graphs in part (b), show what will happen to each of the following if the market for Good G adjusts to long-run equilibrium.
 - The market equilibrium price and quantity, labeled P_2 and Q_2 , respectively
 - Anderson Company's profit-maximizing price and quantity, labeled P^* and Q^* , respectively
 - Assume the production of Good G creates benefits for third parties.
 - Given this situation, will the market equilibrium quantity be greater than, less than, or equal to the allocatively efficient quantity? Explain.
 - The government takes an action that corrects the externality in the market for Good G. As a result of the government's action, does total economic surplus increase, decrease, or stay the same? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Bueno is a firm that produces and sells guava, a type of fruit. The market for guava is perfectly competitive. The marginal private benefit (MPB), marginal private cost (MPC), marginal social benefit (MSB), and marginal social cost (MSC) curves are illustrated in the graph provided.



- (a) Identify the kind of market failure represented by this graph.
- (b) Using numbers from the graph, identify the marginal external benefit.
- (c) Assume the guava market is in short-run equilibrium and Bueno hires workers in a perfectly competitive labor market at a wage of \$20 per hour. The marginal product of the last worker hired was 6 units of guava per hour.
- Calculate the change in Bueno's profit per hour from the last worker hired. Show your work.
 - Suppose that the government decides to provide a per-unit subsidy to consumers who buy guava. How would the per-unit subsidy affect Bueno's marginal revenue product curve? Explain.
- (d) Instead of hiring workers in a perfectly competitive labor market, assume Bueno hires workers in a monopsony labor market. Will the number of workers hired increase, decrease, or stay the same? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

1. Sugar is produced in a perfectly competitive market using inputs from perfectly competitive factor markets. Frank Sugar Co. is a representative firm in the sugar market.
- (a) Assume Frank Sugar Co. is earning zero economic profit. Draw correctly labeled side-by-side graphs for the sugar market and Frank Sugar Co. and show each of the following.
- The market equilibrium price and quantity, labeled P_M and Q_M , respectively
 - The profit-maximizing price and quantity for Frank Sugar Co., labeled P_F and Q_F , respectively
- (b) Assume the demand for sugar increases and sugar is produced in a constant-cost industry.
- On your graph in part (a), show the short-run effect of the increased demand for sugar on the market price, labeled P_2 , and the quantity sold by Frank Sugar Co., labeled Q_N .
 - Compared to the equilibrium identified in part (a)(ii), what will happen to the short-run profit earned by Frank Sugar Co. as a result of the increased demand for sugar?
 - When the market adjusts to long-run equilibrium, how will the market price of sugar in the long run compare to P_2 ? Explain.
- (c) Instead, assume sugar consumption has a negative impact on public health over time and the negative impact of sugar on health is underestimated by consumers. Draw a correctly labeled graph of the market, with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.
- The market equilibrium quantity, labeled Q_M
 - The socially optimal quantity, labeled Q_S
- (d) Assume the government decides to intervene in the market to affect consumers' incentives and to address the negative impact of sugar consumption on public health. Which of the following policies would best achieve that objective in the short run: a lump-sum tax, a per-unit tax, a lump-sum subsidy, or a per-unit subsidy? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Copper is produced in a perfectly competitive market with an upward-sloping supply curve and a downward-sloping demand curve. Assume the production of copper results in liquid waste, which seeps into local rivers. The contaminated river water causes human illnesses and crop failures downstream. The marginal external cost from producing copper is constant across all quantities of copper produced.

(a) Draw a correctly labeled graph of the copper market with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.

- (i) The market equilibrium quantity, labeled Q_M
- (ii) The socially efficient quantity, labeled Q_S

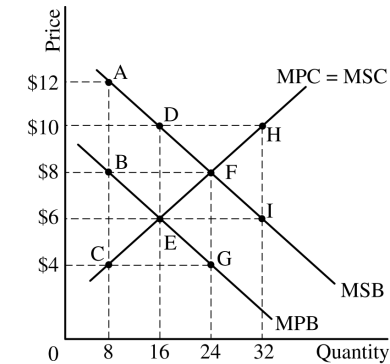
(b) Suppose the demand for copper decreases. On your graph in part (a), show the deadweight loss at the new market equilibrium, shaded completely.

(c) Suppose the government is considering levying a tax on copper.

- (i) What per-unit tax level would achieve the socially optimal quantity?
- (ii) Explain why a lump-sum tax on producers will not achieve the socially optimal quantity in the short run.

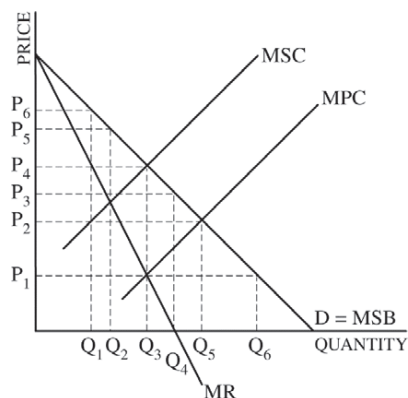
Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Modern-day word processing software gives consumers the ability to create and save documents in different file formats that can then be accessed by multiple computer operating systems. The graph below depicts a perfectly competitive market for word processing software. In the graph, MSB is the marginal social benefit, MPB is the marginal private benefit, MPC is the marginal private cost, and MSC is the marginal social cost.



- (a) Identify the type of market failure illustrated by the graph. Explain.
- (b) Using the numbers on the graph, identify the market equilibrium price and quantity.
- (c) Using the labeling on the graph, identify the area representing the deadweight loss at the quantity identified in part (b).
- (d) Suppose the government is considering granting a subsidy to correct the market failure. What is the dollar value of the per-unit subsidy that would achieve the socially optimal quantity?
- (e) Suppose the government does not grant the subsidy and instead imposes a price floor at \$8.
 - (i) How many units will consumers and producers exchange at the price floor?
 - (ii) Does the price floor correct the market failure? Explain.

3. The graph below shows the marginal social cost (MSC), marginal private cost (MPC), marginal social benefit (MSB), demand (D), and marginal revenue (MR) curves for a monopoly.



- (a) Identify the monopolist's
- profit-maximizing quantity
 - profit-maximizing price
- (b) What information in the graph indicates that there is a negative externality?
- (c) Identify the socially optimal quantity.
- (d) In the case in which the government imposes a per-unit tax equal to the marginal external cost, identify each of the following.
- The dollar value of the tax, using the price labels from the graph
 - The profit-maximizing quantity associated with the tax
- (e) Given the monopoly facing the negative externality, would the deadweight loss increase, decrease, or stay the same as a result of imposing the per-unit tax? Explain.

STOP

END OF EXAM

AP MICROECONOMICS • EXERCISE SHEET

6.3 Public and Private Goods

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS common resource 共有资源 • public good 公共物品 • free-rider problem 搭便车问题
• free-ride 搭便车 • tragedy of the commons 公地悲剧

Objective

Build the skills to answer exam questions on **public and private goods**.

You must be able to:

- classify goods by **rivalry** 竞争性 and **excludability** 排他性
- distinguish a **private good**, a **public good** 公共物品, a **common resource** 共有资源, and a **club good**
- explain the **free-rider problem** 搭便车问题
- explain the **tragedy of the commons** 公地悲剧

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Two properties

- Rival** — one person's use reduces what is left for others.
- Excludable** — non-payers can be kept out.

■ Four types

- Private** — rival and excludable (a sandwich).
- Public** — non-rival and non-excludable (national defence).
- Common resource** — rival and non-excludable (ocean fish).
- Club** — non-rival and excludable (cable TV).

■ Two problems

The **free-rider problem** means markets **underprovide** public goods; the **tragedy of the commons** means common resources are **overused**. Government often steps in.

2 Practice

2.1 Define a public good. [1]

2.2 State the free-rider problem. [1]

2.3 Give one example of a common resource. [1]

3 Exam-style questions

3.1 A public good is [1]

- **A** rival and excludable
 - **B** non-rival and non-excludable
 - **C** rival and non-excludable
 - **D** non-rival and excludable
-

3.2 The tragedy of the commons is the [1]

- **A** overuse of a common resource
 - **B** underuse of a club good
 - **C** free provision of a private good
 - **D** effect of a tax
-

3.3 National defence protects everyone, and no one can be excluded from it.

(a) Name the type of good. [1]

(b) Name the problem that means markets underprovide it. [1]

(c) State who typically provides it. [1]

Solutions

2.1 a good that is non-rival and non-excludable.

2.2 people can enjoy a good without paying for it, so too little is provided.

2.3 ocean fish stocks, a public grazing field, or clean air (any one).

3.1 B.

3.2 A.

3.3 (a) a public good. (b) the free-rider problem. (c) the government.

6.4 The Effects of Government Intervention in Different Market Structures

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS per-unit tax 从量税 • natural monopoly 自然垄断 • antitrust policy 反垄断政策
 • government failure 政府失灵 • market failure 市场失灵

Objective

Build the skills to answer exam questions on **government intervention in different market structures**.

You must be able to:

- analyse how a **per-unit tax** or **subsidy** affects price, quantity, and surplus
- explain how regulation of a **natural monopoly** 自然垄断 can use marginal-cost or average-cost pricing
- describe the aims of **antitrust policy** 反垄断政策
- weigh correcting **market failure** against the costs of **government failure** 政府失灵

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Taxes and subsidies

A **per-unit tax** raises price and cuts quantity; a **subsidy** lowers price and raises quantity. Both change consumer and producer surplus.

■ Regulating a natural monopoly

- **Marginal-cost pricing** ($P = MC$) is efficient but may make the firm lose money.
- **Average-cost pricing** ($P = ATC$) lets it break even.

■ Antitrust and government failure

Antitrust policy limits market power and promotes competition. But intervention can itself be costly or misjudged — **government failure**.

2 Practice

2.1 State the aim of antitrust policy. [1]

2.2 State one way a government can regulate a natural monopoly's price. [1]

2.3 Define government failure. [1]

3 Exam-style questions

3.1 Antitrust policy aims to [1]

- **A** create monopolies
- **B** limit market power and promote competition
- **C** raise taxes
- **D** fix exchange rates

3.2 Setting a natural monopoly's price equal to marginal cost is [1]

- **A** profit-maximizing for the firm
- **B** allocatively efficient
- **C** a subsidy
- **D** a tariff

3.3 A government breaks up a dominant monopoly and regulates the successor firms' prices.

- (a) Name the policy that limits market power. [1]
- (b) State one benefit to consumers. [1]
- (c) Name the risk that the intervention itself is costly or misjudged. [1]

Solutions

2.1 to limit market power and promote competition.

2.2 marginal-cost pricing or average-cost pricing (any one).

2.3 when government intervention itself leads to an inefficient or worse outcome.

3.1 B.

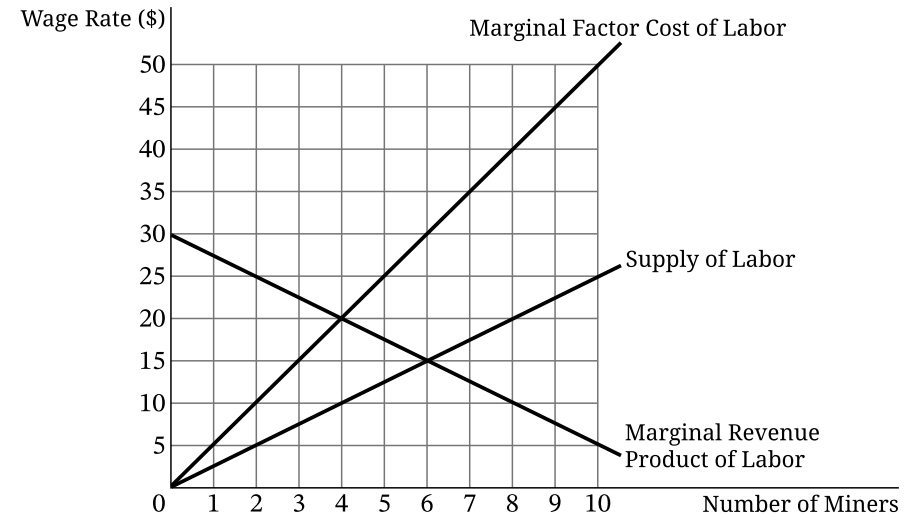
3.2 B.

3.3 (a) antitrust policy. (b) more competition and lower prices. (c) government failure.

1. Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

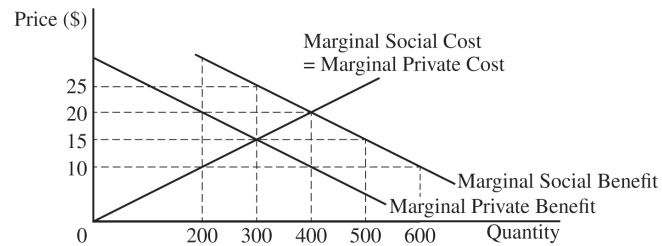
- A. Draw a correctly labeled graph for Voda Reservoir and show each of the following.
- The profit-maximizing quantity, labeled Q_M
 - The profit-maximizing price, labeled P_M
 - The average total cost curve consistent with Voda Reservoir earning negative economic profit, labeled ATC
 - The area of deadweight loss, shaded completely
- B. Suppose the government requires Voda Reservoir to produce the socially optimal quantity of bottled water. On your graph in part A, show the socially optimal quantity of bottled water, labeled Q_S .
- C. Suppose instead the government grants a per-unit subsidy to Voda Reservoir. What will happen to Voda Reservoir's profit-maximizing quantity of bottled water? Explain.
- D. Suppose new producers have entered the bottled-water market and Voda Reservoir continues to operate in the bottled-water market. Will the demand for Voda Reservoir's bottled water become more elastic, become less elastic, or stay the same as new producers enter the market?
- E. Voda Reservoir hires workers in a perfectly competitive labor market.
- If the demand for bottled water increases, what will happen to Voda Reservoir's demand for labor? Explain.
 - The government implements a new regulation that increases the minimum age required for a worker to be employed in a bottled-water factory. What will happen to the market wage in the short run? Explain.

2. Quartz Excavations is a profit-maximizing firm and the only employer of miners of quartz in a small town. The graph provided shows the labor market for miners.



- A. Identify Quartz Excavations' profit-maximizing number of miners to hire.
- B. Will Quartz Excavations pay its profit-maximizing number of miners a wage rate that is equal to \$15, greater than \$15, or less than \$15? Explain using numbers.
- C. Suppose the government sets a minimum wage (a price floor on wages) at \$25. Calculate the total wage bill for Quartz Excavations at the resulting profit-maximizing number of miners. Show your work.
- D. Suppose that instead of a minimum wage, there is now an increase in the demand for quartz.
- Will the marginal revenue product of miners increase, decrease, or remain the same? Explain.
 - After the demand for quartz increases, Quartz Excavations hires the new profit-maximizing number of miners. Will the marginal factor cost of the last miner hired be greater than, less than, or equal to the marginal factor cost of the last miner hired before the demand for quartz increased?

2. Good X is produced and sold in a perfectly competitive market. The provided graph shows the market for Good X.



- (a) Identify the market equilibrium price and quantity.
- (b) Calculate the deadweight loss at the market equilibrium. Show your work.
- (c) Suppose the government wants to eliminate the deadweight loss in the market for Good X.
- Which of the following will achieve the government's objective: a per-unit tax on consumers or a per-unit subsidy to consumers? Explain.
 - What is the dollar value of the per-unit tax or per-unit subsidy identified in part (c)(i) ?
- (d) Suppose instead the government imposes a price ceiling of \$10. Will the price ceiling achieve the socially optimal quantity of Good X? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

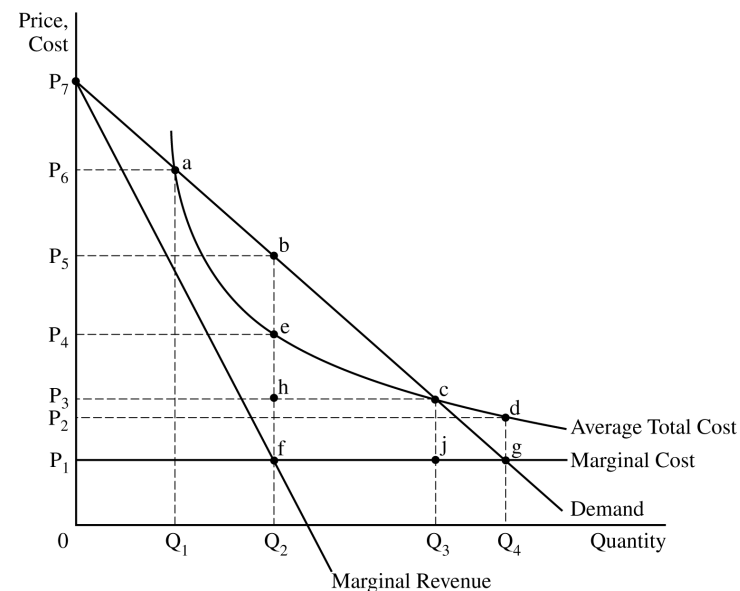
1. RKB is a profit-maximizing monopoly that produces a new, patented electronic device. RKB is earning positive economic profit.

- (a) Draw a correctly labeled graph for RKB, and show each of the following.
- The profit-maximizing quantity, labeled Q_M
 - The profit-maximizing price, labeled P_M
 - The average total cost curve consistent with RKB earning positive economic profit
 - The area representing the deadweight loss, shaded completely
- (b) The government wants RKB to produce the allocatively efficient quantity. Would the government impose a binding price ceiling, a binding price floor, a per-unit tax, or a lump-sum tax?
- (c) Suppose that the government does not impose the policy you identified in part (b). Consumers now become aware of research that confirms the use of this new device harms users' vision. Given widespread consumer awareness of this research, what will happen to RKB's profit-maximizing quantity in the short run? Explain.
- (d) Assume that RKB hires workers in a perfectly competitive labor market.
- Draw a correctly labeled graph for the labor market, showing the equilibrium wage and quantity of labor, labeled W_E and Q_E , respectively.
 - Suppose immigration increases the number of workers in this labor market. On your graph in part (d)(i), show the new equilibrium wage and quantity of labor, labeled W_2 and Q_2 , respectively.
 - RKB uses the optimal combination of capital and labor in its production process. The firm rents capital at \$500 per unit, and the last unit of capital rented has a marginal product of 2,500 units. If the marginal product of the last unit of labor hired is 1,000 units, calculate the wage rate. Show your work.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

1. Anderson Company is a typical firm that manufactures Good G in a constant-cost, perfectly competitive market. Anderson Company is currently earning positive economic profit.
- (a) What must be true about the relationship between accounting profit and economic profit if Anderson Company currently incurs both explicit and implicit costs in production?
- (b) Draw correctly labeled side-by-side graphs for the market and Anderson Company and show each of the following.
- The market equilibrium price and quantity, labeled P_M and Q_M , respectively
 - The profit-maximizing price and quantity for Anderson Company, labeled P_F and Q_F , respectively
 - The area representing Anderson Company's positive economic profit, shaded completely
- (c) On your graphs in part (b), show what will happen to each of the following if the market for Good G adjusts to long-run equilibrium.
- The market equilibrium price and quantity, labeled P_2 and Q_2 , respectively
 - Anderson Company's profit-maximizing price and quantity, labeled P^* and Q^* , respectively
- (d) Assume the production of Good G creates benefits for third parties.
- Given this situation, will the market equilibrium quantity be greater than, less than, or equal to the allocatively efficient quantity? Explain.
 - The government takes an action that corrects the externality in the market for Good G. As a result of the government's action, does total economic surplus increase, decrease, or stay the same? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.



3. The graph shows the cost and revenue curves for an unregulated, profit-maximizing monopoly.
- (a) Is the firm shown in this graph a natural monopoly? Explain.
- (b) Using the labeling from the graph, identify the area representing the deadweight loss for this profit-maximizing monopoly.
- (c) In order to improve resource allocation, the government sets a price that results in the firm earning zero economic profit.
- Using the labeling from the graph, identify the price and resulting quantity the firm would produce.
 - Will this government policy eliminate the deadweight loss? Explain using labeling from the graph.
- (d) Instead, the government decides to set a price that results in the socially optimal quantity of output. Will the firm earn positive, negative, or zero economic profit? Explain using labeling from the graph.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

STOP

END OF EXAM

1. A firm has a patent on a new carbon-capture technology, making it the only producer of that device. The firm is currently earning a positive economic profit and is producing the profit-maximizing level of output.

(a) Draw a correctly labeled graph for the firm and show each of the following.

- (i) The quantity of carbon-capture devices produced by the firm, labeled Q_M
- (ii) The price charged by the firm, labeled P_M
- (iii) The area representing consumer surplus, shaded completely

(b) The government is considering different options to regulate the firm.

- (i) Suppose the government is considering taxing the firm. Could using a per-unit tax change the firm's output to the socially optimal quantity? Explain.
- (ii) Instead, suppose the government imposes a price ceiling so that the firm produces the socially optimal quantity. On your graph in part (a), label the quantity and price after the price ceiling is imposed as Q_C and P_C .
- (iii) At the price and the quantity identified in part (b)(ii), is the firm earning positive economic profit? Explain.

(c) Assume the government decides not to regulate the firm and instead the firm produces the quantity of output that maximizes total revenue.

- (i) If the firm now increases its output by one unit, would marginal revenue be positive, negative, or zero? Explain.
- (ii) Starting at the total-revenue-maximizing quantity, if the firm reduces the price by 10%, would the quantity demanded increase by less than 10%, by more than 10%, or by exactly 10%?

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

1. Sugar is produced in a perfectly competitive market using inputs from perfectly competitive factor markets. Frank Sugar Co. is a representative firm in the sugar market.

(a) Assume Frank Sugar Co. is earning zero economic profit. Draw correctly labeled side-by-side graphs for the sugar market and Frank Sugar Co. and show each of the following.

- (i) The market equilibrium price and quantity, labeled P_M and Q_M , respectively
- (ii) The profit-maximizing price and quantity for Frank Sugar Co., labeled P_F and Q_F , respectively

(b) Assume the demand for sugar increases and sugar is produced in a constant-cost industry.

- (i) On your graph in part (a), show the short-run effect of the increased demand for sugar on the market price, labeled P_2 , and the quantity sold by Frank Sugar Co., labeled Q_N .
- (ii) Compared to the equilibrium identified in part (a)(ii), what will happen to the short-run profit earned by Frank Sugar Co. as a result of the increased demand for sugar?
- (iii) When the market adjusts to long-run equilibrium, how will the market price of sugar in the long run compare to P_2 ? Explain.

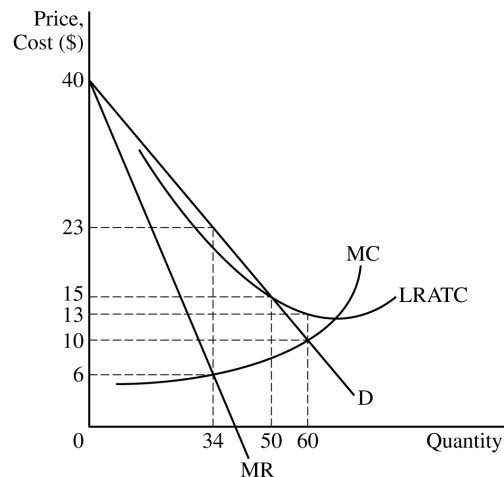
(c) Instead, assume sugar consumption has a negative impact on public health over time and the negative impact of sugar on health is underestimated by consumers. Draw a correctly labeled graph of the market, with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.

- (i) The market equilibrium quantity, labeled Q_M
- (ii) The socially optimal quantity, labeled Q_S

(d) Assume the government decides to intervene in the market to affect consumers' incentives and to address the negative impact of sugar consumption on public health. Which of the following policies would best achieve that objective in the short run: a lump-sum tax, a per-unit tax, a lump-sum subsidy, or a per-unit subsidy? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

3. The graph provided shows the demand (D), long-run average total cost (LRATC), marginal cost (MC), and marginal revenue (MR) curves for a natural monopoly.



- (a) Over the output range of 0 to 60 units, is this firm experiencing economies of scale, diseconomies of scale, or constant returns to scale? Explain.
- (b) Using numbers from the graph, identify the price and quantity produced at which the monopolist earns zero economic profit.
- (c) Assume that regulators impose a price ceiling that results in the firm producing the socially optimal quantity in the short run.
- Calculate the total revenue at the price ceiling. Show your work.
 - Explain why the firm requires a subsidy to continue producing in the long run.
 - Calculate the lump-sum subsidy that would be required for the monopolist to produce the socially optimal quantity in the long run. Show your work.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

STOP

END OF EXAM

1. The government of an island nation grants SkyRunner Airlines exclusive monopoly rights to serve the island. SkyRunner is earning positive economic profits.
- (a) Draw a correctly labeled graph for SkyRunner, and show each of the following.
- The profit-maximizing quantity of tickets, labeled Q_M
 - The profit-maximizing price of a ticket, labeled P_M
 - The area representing profits, shaded completely

Now the island's tourist bureau asks the government to consider the following two proposals.

- Proposal I: Set a price ceiling on tickets that eliminates all deadweight loss.
- Proposal II: Eliminate SkyRunner's monopoly rights, which will remove all barriers to entry.

- (b) Suppose the government adopts proposal I. On your graph in part (a), indicate the quantity of tickets sold in the short run, labeled Q_C .
- (c) Suppose instead the government adopts proposal II. How will each of the following be affected in the long run compared to the market conditions in part (a) ?
- The quantity of tickets sold by SkyRunner. Explain.
 - The price elasticity of demand for SkyRunner's airline service. Explain.
 - SkyRunner's profits
 - The deadweight loss in the market. Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Copper is produced in a perfectly competitive market with an upward-sloping supply curve and a downward-sloping demand curve. Assume the production of copper results in liquid waste, which seeps into local rivers. The contaminated river water causes human illnesses and crop failures downstream. The marginal external cost from producing copper is constant across all quantities of copper produced.

(a) Draw a correctly labeled graph of the copper market with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.

- (i) The market equilibrium quantity, labeled Q_M
- (ii) The socially efficient quantity, labeled Q_S

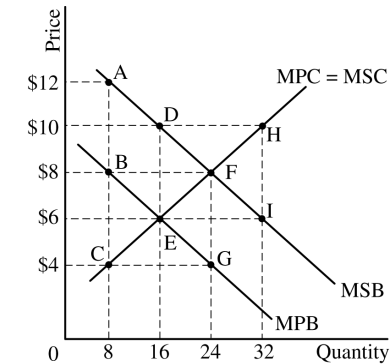
(b) Suppose the demand for copper decreases. On your graph in part (a), show the deadweight loss at the new market equilibrium, shaded completely.

(c) Suppose the government is considering levying a tax on copper.

- (i) What per-unit tax level would achieve the socially optimal quantity?
- (ii) Explain why a lump-sum tax on producers will not achieve the socially optimal quantity in the short run.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Modern-day word processing software gives consumers the ability to create and save documents in different file formats that can then be accessed by multiple computer operating systems. The graph below depicts a perfectly competitive market for word processing software. In the graph, MSB is the marginal social benefit, MPB is the marginal private benefit, MPC is the marginal private cost, and MSC is the marginal social cost.



- (a) Identify the type of market failure illustrated by the graph. Explain.
- (b) Using the numbers on the graph, identify the market equilibrium price and quantity.
- (c) Using the labeling on the graph, identify the area representing the deadweight loss at the quantity identified in part (b).
- (d) Suppose the government is considering granting a subsidy to correct the market failure. What is the dollar value of the per-unit subsidy that would achieve the socially optimal quantity?
- (e) Suppose the government does not grant the subsidy and instead imposes a price floor at \$8.
 - (i) How many units will consumers and producers exchange at the price floor?
 - (ii) Does the price floor correct the market failure? Explain.

6.5 Inequality

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

KEY WORDS progressive 累进 • gini coefficient 基尼系数 • lorenz curve 洛伦兹曲线
• regressive 累退 • wealth inequality 财富不平等

Objective

Build the skills to answer exam questions on **inequality**.

You must be able to:

- distinguish **income inequality** 收入不平等 from **wealth inequality** 财富不平等
- interpret a **Lorenz curve** 洛伦兹曲线
- calculate and interpret the **Gini coefficient** 基尼系数
- distinguish **progressive** 累进, **proportional** 比例, and **regressive** 累退 tax structures

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Income vs wealth

Income is a flow (earnings over a period); **wealth** is a stock (accumulated assets). Wealth is usually more unequal.

■ Lorenz curve and Gini

The **Lorenz curve** plots the cumulative share of income against the cumulative share of the population; the further it bows from the 45-degree line, the more unequal. The **Gini coefficient** ranges from 0 (perfect equality) to 1 (perfect inequality).

■ Tax structures

Progressive — the rate rises with income; **proportional** — a flat rate; **regressive** — the rate falls as income rises. Progressive taxes reduce inequality.

2 Practice

2.1 State the difference between income and wealth inequality. [2]

2.2 State what a Gini coefficient of 0 means. [1]

2.3 State the difference between a progressive and a regressive tax. [2]

3 Exam-style questions

3.1 A Lorenz curve plots the distribution of [1]

- **A** prices
- **B** income
- **C** output
- **D** interest rates

3.2 A progressive tax takes a _____ share of income as income rises. [1]

- **A** smaller
- **B** larger
- **C** constant
- **D** zero

3.3 A country's Gini coefficient rises from 0.30 to 0.45.

- (a) State whether inequality rose or fell. [1]
(b) State what a Gini of 0 would mean. [1]
(c) Name a tax structure that reduces inequality. [1]

Solutions

2.1 income inequality is about the flow of earnings; wealth inequality is about the stock of accumulated assets.

2.2 perfect equality (everyone has the same income).

2.3 a progressive tax takes a larger share of income as income rises; a regressive tax takes a smaller share as income rises.

3.1 B.

3.2 B.

3.3 (a) it rose. (b) perfect income equality. (c) a progressive tax.