

Week 1

AP Microeconomics

Homework bundle for this week

本周作业合集

exercises.lol

Contents 目录

Topic 1 quiz	2
Exercise sheet 1.1	5
Exercise sheet 1.2	9
Exercise sheet 1.3	13
Past-paper questions 1.3	16
Exercise sheet 1.4	18
Past-paper questions 1.4	22
Exercise sheet 1.5	23
Past-paper questions 1.5	26
Exercise sheet 1.6	28
Past-paper questions 1.6	32

AP Microeconomics

Name: _____ Score: _____

1. Scarcity exists because...
 - ☐ people are lazy
 - ☐ wants are unlimited but resources are limited
 - ☐ money has not been invented yet
 - ☐ governments make bad choices
2. Every economic system must answer three questions. Which set is correct?
 - ☐ What, how, and for whom to produce
 - ☐ When, where, and why to produce
 - ☐ Who to tax, spend, and borrow from
 - ☐ How much to import, export, and save
3. A country is producing at a point **inside** its PPC. This means:
 - ☐ some of its resources are idle or unemployed
 - ☐ it is producing efficiently
 - ☐ it needs more resources than exist
 - ☐ it has achieved economic growth
4. A country has an **absolute advantage** in a good when it can:
 - ☐ produce more of it with the same resources
 - ☐ produce it at a lower opportunity cost
 - ☐ sell it at a higher price
 - ☐ produce it without any resources
5. Cost-benefit analysis says to take an action when:
 - ☐ the benefit is at least as large as the cost
 - ☐ you have already paid for it
 - ☐ the cost is high
 - ☐ other people are doing it
6. Only poor people and poor countries face scarcity.
 - ☐ True ☐ False

7. With its current resources, an economy can produce at a point outside its PPC.

☐ True ☐ False

8. The 4th cookie has a marginal benefit of 6 dollars and a marginal cost of 2 dollars. By how much (in dollars) does making it change your net benefit?

_____ dollars

9. The value of the single best alternative you give up is the _____ cost.

10. In a pure market economy, a central planner sets the prices.

☐ True ☐ False

AP Microeconomics

1. **wants are unlimited but resources are limited**

Scarcity is the gap between unlimited wants and the limited resources available to satisfy them.

2. **What, how, and for whom to produce**

Scarcity forces every economy to decide **what** goods, **how** they are made, and **for whom**.

3. **some of its resources are idle or unemployed**

Inside the curve, resources sit idle — the economy could make more of both goods.

4. **produce more of it with the same resources**

Absolute advantage is about raw output; comparative advantage is about opportunity cost.

5. **the benefit is at least as large as the cost**

Act only when $\text{benefit} \geq \text{cost}$ — comparing what you gain with what you give up.

6. **False**

Everyone faces scarcity of **some** resource — even the wealthy run short of time.

7. **False**

Points outside are unattainable now — reaching them needs economic growth.

8. **4 dollars**

Net benefit rises by $MB - MC = 6 - 2 = 4$. Since $MB > MC$, it is worth making.

9. **opportunity**

Opportunity cost is what you sacrifice — the next-best choice — when you decide.

10. **False**

No one sets them — prices emerge from buyers and sellers. That is the invisible hand.

1.1 Scarcity

Name: _____ Class: _____ Date: _____

Total: 10 marks

KEY WORDS opportunity cost 机会成本 • factors of production 生产要素 • scarcity 稀缺性 • free goods 自由物品
• resources 资源

Objective

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

You must be able to:

- explain how **scarcity** 稀缺性 arises from limited resources and unlimited wants
- identify the four **factors of production** 生产要素
- define **opportunity cost** 机会成本 as the value of the next-best alternative given up
- distinguish **economic goods** 经济物品 (scarce) from **free goods** 自由物品 (not scarce)

1 Worked examples

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

■ Scarcity forces choices

Resources are **limited** but wants are **unlimited**, so individuals and societies must choose.

■ The four factors of production

Land, labour, capital, and entrepreneurship.

■ Opportunity cost

The **next-best alternative** given up — not the money price, but what is sacrificed.

■ Economic vs free goods

An **economic good** is scarce and has an opportunity cost; a **free good** (like air where abundant) is not scarce.

2 Practice

2.1 Define opportunity cost. [1]

2.2 List the four factors of production. [2]

2.3 State the difference between an economic good and a free good. [2]

3 Exam-style questions

3.1 The opportunity cost of a choice is [1]

- **A** its money price
- **B** the value of the next-best alternative given up
- **C** the total cost of everything
- **D** always zero

3.2 Which of these is a free good? [1]

- **A** a car
- **B** clean air where it is abundant
- **C** a loaf of bread
- **D** a haircut

3.3 A student spends an evening studying instead of working a \$40 shift.

(a) State the opportunity cost of studying. [1]

(b) Name the factor of production that human effort represents. [1]

(c) Explain why the student must make a choice.

[1]

Solutions

2.1 the value of the next-best alternative given up when a choice is made.

2.2 land, labour, capital, entrepreneurship.

2.3 an economic good is scarce and has an opportunity cost; a free good is not scarce.

3.1 B.

3.2 B.

3.3 (a) the \$40 of wages given up. (b) labour. (c) time is scarce — an evening can be used only once.

1.2 Resource Allocation and Economic Systems

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS price mechanism 价格机制 • incentives 激励 • mixed 混合经济 • economic system 经济体制
• market economy 市场经济

Objective

Build the skills to answer exam questions on **resource allocation and economic systems**.

You must be able to:

- explain the three basic questions: what, how, and for whom to produce
- compare a **command economy** 计划经济, a **market economy** 市场经济, and a **mixed economy** 混合经济
- describe the role of **incentives** 激励 and the **price mechanism** 价格机制

1 Worked examples

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

■ The three questions

Every economy must answer **what** to produce, **how** to produce it, and **for whom**.

■ Three systems

- **Command** — the government decides.
- **Market** — the **price mechanism** decides through supply and demand.
- **Mixed** — a blend of both (most real economies).

■ Prices and incentives

Prices **signal** what is wanted and **ration** scarce goods; incentives guide producers and consumers toward efficient choices. Each system trades off efficiency, equity, and freedom.

2 Practice

2.1 Name the three types of economic system. [2]

2.2 State how a market economy allocates resources. [1]

2.3 State one trade-off that an economic system must make. [1]

3 Exam-style questions

3.1 In a command economy, resources are allocated by [1]

- **A** market prices
- **B** the government
- **C** individual firms
- **D** consumers alone

3.2 The price mechanism in a market economy [1]

- **A** is set entirely by the state
- **B** signals and rations goods
- **C** ignores demand
- **D** fixes all wages

3.3 A country uses both markets and some government planning.

(a) Name this type of economy. [1]

(b) State one advantage of using markets. [1]

(c) State one reason for government involvement.

[1]

Solutions

2.1 command, market, mixed.

2.2 through the price mechanism (supply and demand).

2.3 any one of: efficiency vs equity, or freedom vs government control.

3.1 B.

3.2 B.

3.3 (a) a mixed economy. (b) prices give efficient signals and incentives. (c) to provide public goods, correct market failures, or improve equity (any one).

1.3 The Production Possibilities Curve

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS efficient 有效率 • unattainable 无法实现 • economic growth 经济增长 • production possibilities curve 生产可能性曲线
• opportunity cost 机会成本

Objective

Build the skills to answer exam questions on **the production possibilities curve**.

You must be able to:

- draw and interpret a **production possibilities curve (PPC)** 生产可能性曲线
- use it to show **scarcity**, **opportunity cost**, and trade-offs
- distinguish efficient, inefficient, and unattainable points
- link a **bowed-out** PPC to increasing opportunity cost

1 Worked examples

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

■ The PPC

Shows the maximum combinations of two goods an economy can produce. Points **on** the curve are efficient; **inside** are inefficient; **outside** are unattainable now.

■ Shape

A **bowed-out** PPC reflects the law of **increasing** opportunity cost; a **straight-line** PPC reflects constant opportunity cost.

■ Growth

More or better resources, or new technology, shift the PPC **outward**.

2 Practice

2.1 State what a point **on** the PPC represents. [1]

2.2 State what a bowed-out PPC shows about opportunity cost. [1]

2.3 A country moves from 8 wheat and 30 cloth to 12 wheat and 20 cloth. Find the opportunity cost of the 4 extra wheat. [2]

3 Exam-style questions

3.1 A point inside the PPC is [1]

- **A** efficient
 - **B** inefficient
 - **C** unattainable
 - **D** optimal
-

3.2 A straight-line PPC shows [1]

- **A** increasing opportunity cost
 - **B** constant opportunity cost
 - **C** zero output
 - **D** economic growth
-

3.3 An economy's resources and technology both improve.

(a) State the effect on the PPC. [1]

(b) Name the process. [1]

(c) State whether a previously unattainable point may now be reachable. [1]

Solutions

2.1 an efficient, fully-employed use of all resources.

2.2 the opportunity cost increases as more of a good is produced.

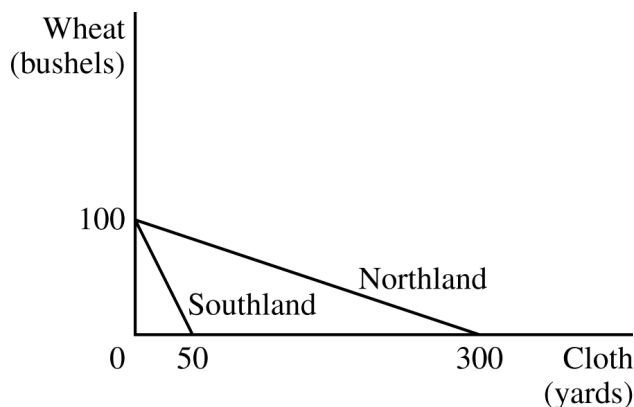
2.3 cloth falls from 30 to 20, a loss of 10 cloth; so 4 wheat cost 10 cloth.

3.1 B.

3.2 B.

3.3 (a) it shifts outward. (b) economic growth. (c) yes.

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



- (a) Which country has a comparative advantage in producing wheat? Explain using numbers.
- (b) 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.
- (c) 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.
- (d) 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.

3. Nirali is a student at the University of Ainsley. She has 5 hours to study for two exams today. The tables below show Nirali's expected scores given the amount of time she studies for each exam.

Number of Hours Spent Studying Microeconomics	Expected Score on Microeconomics Exam (100-point scale)
5	100
4	96
3	90
2	82
1	60
0	0

Number of Hours Spent Studying History	Expected Score on History Exam (100-point scale)
0	0
1	40
2	60
3	72
4	77
5	80

- (a) Nirali spends 3 hours studying microeconomics and 2 hours studying history. Calculate her gain from the second hour spent studying history.
- (b) Calculate Nirali's opportunity cost of the second hour spent studying history.
- (c) Assume Nirali increases the time she allocates to studying history. What happens to the opportunity cost of studying history? Explain.
- (d) Assume that Nirali has a goal of maximizing the sum of her test scores (the score on microeconomics plus the score on history). How many hours should she study for each exam?
- (e) Nirali learns that her tennis practice has been canceled, freeing up an additional hour for studying. Given your answer to part (d), will Nirali allocate the additional hour to studying microeconomics or to studying history to maximize the sum of her test scores? Explain using marginal analysis.

STOP

END OF EXAM

1.4 Comparative Advantage and Gains from Trade

Name: _____ Class: _____ Date: _____

Total: 10 marks

KEY WORDS comparative advantage 比较优势 • opportunity costs 机会成本 • terms of trade 贸易条件
• absolute advantage 绝对优势 • specializing 专业化

Objective

Build the skills to answer exam questions on **comparative advantage and gains from trade**.

You must be able to:

- calculate **opportunity costs** 机会成本 from output data
- distinguish **absolute advantage** 绝对优势 from **comparative advantage** 比较优势
- identify a mutually beneficial **terms of trade** 贸易条件
- explain how specialization and trade let both parties consume **beyond** their own PPC

1 Worked examples

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

■ Opportunity cost and advantage

Absolute advantage = producing more; **comparative** advantage = producing at a **lower opportunity cost**. Specialize by comparative advantage.

■ Terms of trade

A mutually beneficial exchange rate lies **between** the two parties' opportunity costs.

■ Consuming beyond the PPC

By specializing and trading, each party can end up with more of both goods than it could produce alone.

2 Practice

2.1 State the difference between absolute and comparative advantage. [2]

2.2 State how specialization and trade let a country consume beyond its own PPC. [1]

2.3 Country A can make 12 wheat **or** 6 cloth. Find A's opportunity cost of 1 cloth. [2]

3 Exam-style questions

3.1 A mutually beneficial terms of trade lies [1]

- **A** above both parties' opportunity costs
- **B** between the two parties' opportunity costs
- **C** below both parties' opportunity costs
- **D** at exactly zero

3.2 Specialization should be based on [1]

- **A** absolute advantage
- **B** comparative advantage
- **C** population size
- **D** tariffs

3.3 In a day, Maya makes 6 tables **or** 12 chairs; Leo makes 2 tables **or** 8 chairs.

(a) Find Maya's opportunity cost of 1 table. [1]

(b) Find Leo's opportunity cost of 1 table. [1]

(c) State who should specialize in tables.

[1]

Solutions

2.1 absolute advantage is producing more with the same resources; comparative advantage is producing at a lower opportunity cost.

2.2 each specializes where its opportunity cost is lowest, then trades, so both get more than they could produce alone.

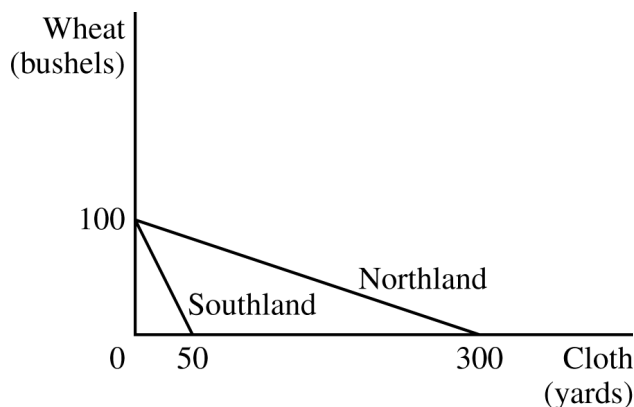
2.3 1 cloth costs $\frac{12}{6} = 2$ wheat.

3.1 B.

3.2 B.

3.3 (a) 2 chairs. (b) 4 chairs. (c) Maya — her opportunity cost (2 chairs) is lower.

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



- (a) Which country has a comparative advantage in producing wheat? Explain using numbers.
- (b) 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.
- (c) 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.
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1.5 Cost-Benefit Analysis

Name: _____ Class: _____ Date: _____

Total: 10 marks

KEY WORDS sunk cost 沉没成本 • implicit costs 隐性成本 • explicit costs 显性成本 • opportunity cost 机会成本
• resources 资源

Objective

Build the skills to answer exam questions on **cost-benefit analysis**.

You must be able to:

- explain that rational decision-makers weigh **total benefits** and **total costs**
- distinguish **explicit costs** 显性成本 from **implicit costs** 隐性成本
- apply the rule that an action is worthwhile only if its benefits at least equal its costs
- explain why **sunk costs** 沉没成本 should be ignored

1 Worked examples

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

■ The decision rule

Undertake an action only if its **total benefit** is at least as large as its **total cost**.

■ Explicit vs implicit costs

Explicit costs are out-of-pocket payments; **implicit** costs are the opportunity cost of resources you already own (e.g. wages you could earn elsewhere).

■ Ignore sunk costs

A **sunk cost** is already spent and cannot be recovered, so it should **not** affect the decision going forward — only future costs and benefits matter.

2 Practice

2.1 State the rule for deciding whether an action is worthwhile. [1]

2.2 State the difference between explicit and implicit costs. [2]

2.3 Explain why sunk costs should be ignored in decisions. [2]

3 Exam-style questions

3.1 A sunk cost is one that [1]

- **A** can be recovered
 - **B** cannot be recovered
 - **C** is always small
 - **D** is really a benefit
-

3.2 The implicit cost of running your own business includes [1]

- **A** the rent you pay
 - **B** the wages you could have earned elsewhere
 - **C** your electricity bills
 - **D** the materials you buy
-

3.3 A firm has already spent \$10 000 on a project (unrecoverable). Finishing it costs \$3000 more and earns \$4000.

(a) State whether it should finish the project. [1]

(b) Explain, correctly ignoring the sunk cost. [2]

Solutions

2.1 proceed only if the total benefit is at least as large as the total cost.

2.2 explicit costs are out-of-pocket payments; implicit costs are the opportunity cost of resources you already own.

2.3 they are already spent and cannot be recovered, so they do not change the future benefits or costs of the decision.

3.1 B.

3.2 B.

3.3 (a) yes, it should finish. (b) the \$10 000 is sunk and irrelevant; the extra benefit (\$4000) exceeds the extra cost (\$3000), so finishing adds \$1000 of net benefit.

3. The table below shows the total cost and total benefit of advertisements placed by AZY Foods, a firm in the retail food market.

Number of Advertisements	Total Cost (\$)	Total Benefit (\$)
1	300	1,200
2	500	2,200
3	800	3,000
4	1,300	3,600
5	2,100	4,000
6	3,000	4,200
7	4,100	4,200

- (a) Calculate the total net benefit of placing three advertisements. Show your work.
- (b) Calculate the marginal net benefit of the third advertisement. Show your work.
- (c) What is the optimal number of advertisements placed by AZY Foods? Explain using marginal analysis.
- (d) Suppose over the next year the marginal benefit that AZY Foods receives from each advertisement increases by \$300. Identify the optimal number of advertisements.
- (e) There are many firms in the retail food market. Each firm places its own firm-specific advertisements without considering the actions of its competitors. In what market structure is AZY Foods operating?

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. Nirali is a student at the University of Ainsley. She has 5 hours to study for two exams today. The tables below show Nirali's expected scores given the amount of time she studies for each exam.

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4	77
5	80

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- (b) Calculate Nirali's opportunity cost of the second hour spent studying history.
- (c) Assume Nirali increases the time she allocates to studying history. What happens to the opportunity cost of studying history? Explain.
- (d) Assume that Nirali has a goal of maximizing the sum of her test scores (the score on microeconomics plus the score on history). How many hours should she study for each exam?
- (e) Nirali learns that her tennis practice has been canceled, freeing up an additional hour for studying. Given your answer to part (d), will Nirali allocate the additional hour to studying microeconomics or to studying history to maximize the sum of her test scores? Explain using marginal analysis.

STOP

END OF EXAM

1.6 Marginal Analysis and Consumer Choice

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS marginal benefit 边际收益 • marginal analysis 边际分析 • utility 效用 • marginal cost 边际成本
 • law of diminishing marginal utility 边际效用递减法则

Objective

Build the skills to answer exam questions on **marginal analysis and consumer choice**.

You must be able to:

- define **marginal benefit** 边际收益 and **marginal cost** 边际成本 and use marginal analysis
- apply the **law of diminishing marginal utility** 边际效用递减
- state and apply the **utility-maximizing rule** — equalize $\frac{MU}{P}$ across goods

1 Worked examples

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

■ Marginal analysis

Do one more unit while its **marginal benefit** exceeds its **marginal cost**; stop where $MB = MC$.

■ Diminishing marginal utility

Each extra unit consumed gives **less** added satisfaction than the one before.

■ The utility-maximizing rule

Spend a fixed budget so that the marginal utility per dollar, $\frac{MU}{P}$, is **equal** across all goods. If $\frac{MU_X}{P_X} > \frac{MU_Y}{P_Y}$, buy more X.

2 Practice

2.1 State the law of diminishing marginal utility. [1]

2.2 State the utility-maximizing rule. [1]

2.3 A consumer buys where marginal benefit equals marginal cost. Explain why buying one more unit would lower net benefit. [2]

3 Exam-style questions

3.1 A consumer maximizes total net benefit where [1]

- **A** $MB > MC$
 - **B** $MB = MC$
 - **C** $MB < MC$
 - **D** the price is lowest
-

3.2 The law of diminishing marginal utility says that extra units give [1]

- **A** more added satisfaction
 - **B** less added satisfaction
 - **C** zero cost
 - **D** a higher price
-

3.3 Good X has $MU = 20$ and $P = \$4$. Good Y has $MU = 15$ and $P = \$5$.

(a) Find $\frac{MU}{P}$ for each good. [2]

(b) State which good the consumer should buy more of.

[1]

Solutions

2.1 each additional unit consumed adds less extra satisfaction than the previous one.

2.2 allocate spending so that $\frac{MU}{P}$ is equal for all goods.

2.3 beyond $MB = MC$, the next unit's marginal cost exceeds its marginal benefit, so it subtracts from total net benefit.

3.1 B.

3.2 B.

3.3 (a) X: $\frac{20}{4} = 5$; Y: $\frac{15}{5} = 3$. (b) buy more of good X (its MU/P is higher).

3. The table provided shows the marginal utility for Lucy when she consumes Good X and Good Y.

Quantity of Good X	Marginal Utility of Good X (utils)	Quantity of Good Y	Marginal Utility of Good Y (utils)
1	20	1	28
2	16	2	24
3	12	3	16
4	8	4	8
5	4	5	-4
6	-2	6	-8

- A. If Good X and Good Y are free, how many units of each good will maximize Lucy's total utility?
- B. Calculate Lucy's total utility if she consumes 2 units of Good X and 2 units of Good Y. Show your work.
- C. Suppose instead that the price of each unit of Good X is \$2 and the price of each unit of Good Y is \$4. Lucy has a budget of \$20 to spend on the two goods.
- If Lucy purchases 2 units of Good X, what is the maximum quantity of Good Y Lucy can purchase?
 - What is Lucy's optimal combination of Good X and Good Y? Explain your answer using marginal analysis and numbers.
- D. Suppose the price elasticity of demand for Good X is -2.0 , the price elasticity of demand for Good Y is -0.8 , and the cross-price elasticity of demand between Good X and Good Y is $+1.6$. Are goods X and Y complementary goods, substitute goods, normal goods, or inferior goods? Explain.

STOP

END OF EXAM

3. In the local market for Good X, there are four individual buyers: Emily, Wu, Omar, and Fernanda. The quantities that each individual buyer would be willing and able to purchase at different prices are included in the table provided.

Price	Quantity of Good X			
	Emily	Wu	Omar	Fernanda
\$1	5	4	4	3
\$2	4	3	4	3
\$3	4	3	3	2
\$4	3	2	3	2
\$5	3	2	2	1
\$6	2	1	2	1
\$7	2	1	1	0
\$8	1	0	1	0

(a) The local market for Good X has a perfectly elastic supply. Draw a correctly labeled graph for the local market for Good X with a market equilibrium price of \$5. Label the equilibrium price as \$5, and label the equilibrium quantity for the market with a specific value based on the data provided in the table.

(b) Assume the cost of production increases, which causes the price of Good X to increase from \$5 to \$7.

(i) Calculate the price elasticity of demand for Good X as the price increases from \$5 to \$7. Show your work.

(ii) Identify whether the demand for Good X is elastic, inelastic, or unit elastic in that range of prices.

(c) Could Emily's marginal benefit for the second unit of Good X equal \$4.50 ? 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 table below shows the total cost and total benefit of advertisements placed by AZY Foods, a firm in the retail food market.

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7	4,100	4,200

- (a) Calculate the total net benefit of placing three advertisements. Show your work.
- (b) Calculate the marginal net benefit of the third advertisement. Show your work.
- (c) What is the optimal number of advertisements placed by AZY Foods? Explain using marginal analysis.
- (d) Suppose over the next year the marginal benefit that AZY Foods receives from each advertisement increases by \$300. Identify the optimal number of advertisements.
- (e) There are many firms in the retail food market. Each firm places its own firm-specific advertisements without considering the actions of its competitors. In what market structure is AZY Foods operating?

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STOP

END OF EXAM

2. The following is a table showing Dana's marginal benefit from purchasing bottles of water and good X from a grocery store.

Quantity of Water (in bottles)	Marginal Benefit of Water (in dollars)	Quantity of Good X (in units)	Marginal Benefit of Good X (in dollars)
1	24	1	24
2	18	2	18
3	12	3	12
4	6	4	6
5	3	5	3

- (a) What is Dana's total benefit from purchasing 2 bottles of water and 1 unit of good X? Show your work.
- (b) Assume the price of a unit of good X is \$5. Calculate the total consumer surplus if Dana purchases 3 units of good X. Show your work.
- (c) Now assume the price of a bottle of water is \$3 and the price of a unit of good X is \$6. Dana spends her entire budget of \$30 on bottles of water and good X.
- (i) Explain why Dana does not maximize her benefit when she purchases 2 bottles of water and 4 units of good X. Use marginal analysis to explain your answer.
- (ii) What are the optimal quantities of good X and bottles of water at these prices?
- (iii) Suppose the price of a unit of good X drops to \$3. Calculate Dana's cross-price elasticity of demand for bottles of water with respect to the price of good X, and state whether the two goods are substitutes or complements. Show your work.

3. Nirali is a student at the University of Ainsley. She has 5 hours to study for two exams today. The tables below show Nirali's expected scores given the amount of time she studies for each exam.

Number of Hours Spent Studying Microeconomics	Expected Score on Microeconomics Exam (100-point scale)
5	100
4	96
3	90
2	82
1	60
0	0

Number of Hours Spent Studying History	Expected Score on History Exam (100-point scale)
0	0
1	40
2	60
3	72
4	77
5	80

- (a) Nirali spends 3 hours studying microeconomics and 2 hours studying history. Calculate her gain from the second hour spent studying history.
- (b) Calculate Nirali's opportunity cost of the second hour spent studying history.
- (c) Assume Nirali increases the time she allocates to studying history. What happens to the opportunity cost of studying history? Explain.
- (d) Assume that Nirali has a goal of maximizing the sum of her test scores (the score on microeconomics plus the score on history). How many hours should she study for each exam?
- (e) Nirali learns that her tennis practice has been canceled, freeing up an additional hour for studying. Given your answer to part (d), will Nirali allocate the additional hour to studying microeconomics or to studying history to maximize the sum of her test scores? Explain using marginal analysis.

STOP

END OF EXAM

2. Martha has a fixed budget of \$20, and she spends it all on two goods, X and Y. The price of X is \$4 per unit, and the price of Y is \$2 per unit. The table below shows the total benefit, measured in dollars, Martha receives from the consumption of each good.

Quantity of X	Total Benefit from X	Quantity of Y	Total Benefit from Y
0	\$0	0	\$0
1	\$16	1	\$10
2	\$28	2	\$18
3	\$36	3	\$24
4	\$40	4	\$28
5	\$41	5	\$30

- (a) What is Martha's marginal benefit of the fifth unit of good X?
- (b) Calculate the total consumer surplus if Martha consumes 5 units of X. Show your work.
- (c) Martha is currently consuming 4 units of X and 2 units of Y. Use marginal analysis to explain why this combination is not optimal for Martha.
- (d) What is Martha's optimal combination of goods X and Y?
- (e) Indicate whether each of the following will cause the optimal quantity of good Y to increase, decrease, or stay the same.
- (i) The price of good Y doubles.
 - (ii) Martha's income falls to \$10 with no changes in prices.
 - (iii) Martha's income doubles, and the price of both goods double.