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.

i. If Lucy purchases 2 units of Good X, what is the maximum quantity of Good Y Lucy can purchase?

ii. 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.

	Quantity of Good X			
Price	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.

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

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.