Profit and Profit Maximization
Problem Set

Use the table below to answer questions 1-3.

Number of Games	Total Benefit
0	0
1	50
2	90
3	120
4	140
5	152
6	160
7	164
8	162

1. Rodger is deciding how many football games he wants to attend this year. The total benefit that Rodger receives from football games is shown in the table. Rodger's marginal benefit from increasing the number of games that he attends from two to three is:
   a. 40.
   b. 120.
   c. 10.
   d. 20.
   e. 30.

2. Rodger is deciding how many football games he wants to attend this year. The total benefit that Rodger receives from football games is shown in the table. If tickets to each football game cost $10, then he should attend _____ game(s).
   a. 0
   b. 1
   c. 2
   d. 5
   e. 6

3. Rodger is deciding how many football games he wants to attend this year. The total benefit that Rodger receives from football games is shown in the table. If the games are free, he should attend _____ game(s).
   a. 1
   b. 5
   c. 7
   d. 8
   e. 0

4. Sarah's accountant tells her that she made a profit of $43,002 running a pottery studio in Orlando. Sarah's husband—an economist—claims Sarah lost $43,002 running her pottery studio. This means her husband is claiming that she incurred _____ in _____ costs.
   a. $86,004; implicit
   b. $43,002; implicit
   c. $43,002; explicit
   d. $86,004; explicit
   e. $0; explicit

Use the table below to answer questions 5.

Quantity of Gadgets Produced	Total Cost	Total Benefit
0	$100	$0
1	$105	$200
2	$110	$215
3	$115	$225
4	$120	$230
5	$125	$223

5. You own a small manufacturing company that produces gadgets. The table shows the quantity of gadgets that you could produce, the total cost you incur at each level of production, and the total benefit your customer receives at each level of production. According to the table, how many gadgets should you produce?
   a. 2
   b. 3
   c. 1
   d. 5
   e. 4

6. After earning your BA, you have to decide whether to accept the offer of a job that will pay you $45,000 per year or spend an additional two years earning an MBA. If you decide to pursue the graduate degree, your annual expenses for tuition, books, board, and lodging will be $32,000. You have been offered a scholarship for $10,000 per year, but in order to pay the remaining $22,000 per year, you would have to cash in savings bonds that your grandparents have given you that have been earning $500 in interest per year. The annual opportunity cost of earning your MBA is:
   a. $67,500.
   b. $77,000.
   c. $99,000.
   d. $77,500.
   e. $99,500

7. Until recently Rosemarie worked as an accountant, earning $30,000 annually. Then she inherited a piece of commercial real estate that had been renting for $12,000 annually. Rosemarie decided to leave her job and operate a Peruvian restaurant in the space she inherited. At the end of the first year, her books showed total revenues of $260,000 and total costs of $230,000 for food, utilities, cooks, and other supplies. Her economic profit at the end of one year is:
   a. $230,000.
   b. $30,000.
   c. $0.
   d. -$42,000.
   e. -$12,000.

8. Bessie wants to calculate the accounting and economic profits on her cattle farm in Nebraska. She pays $30,000 per year for the cost of raising cattle, $80,000 in wages, $20,000 in insurance, and she forgoes $30,000 per year that she could make as a teacher. If her total revenue equals $140,000, that means her accounting profit is _____ and her economic profit is _____.
   a. **$10,000; -$20,000**
   b. $30,000; -$30,000
   c. -$10,000; -$10,000
   d. $60,000; $30,000
   e. $10,000; - $30,000

9. Pauli's Pizza offers the following prices: one slice for $2, two slices for $3.50, three slices for $4.50, four slices for $5.00. Sal orders two slices. From this we know that Sal's marginal benefit from the second slice must be at least _____ while the marginal benefit from the third slice must be at least _____.
   a. $3.50; $4.50
   b. $3.50; $1.00
   c. **$1.50; $1.00**
   d. $1.50; $4.50
   e. $5.50; $10.50

10. Some highways have one lane, others have two, three, or more. If each lane costs $10 million per mile, an economist would assume that the total benefit of a three-lane highway must be:
    a. less than $10 million per mile.
    b. $10 to $20 million per mile.
    c. $20 to $30 million per mile.
    d. **$30 million or more per mile.**
    e. $0, as the cost of building the highway is a sunk cost.

11. Sundreana owns and operates Sundreana's Sno-Cone Stand. Use the data in the table provided to answer the questions below.

Sundreana's Sno-Cone Stand: February	
Price of Sno Cone	$2
Sno Cones sold	2,000
Explicit cost	$400
Depreciation	$100
Implicit cost of capital	$200

   a. Calculate Sundreana's Sno-Cone Stand's total revenue for February. **$2,000 X $2 = $4,000**
   b. Calculate Sundreana's Sno-Cone Stand's accounting profit for February. **$4,000 - $400 - $100 = $3,500**
   c. What additional information would Sundreana need in order to determine whether or not to continue operating the Sno Cone Stand? **Sundreana would need to know the opportunity cost of her time.**
   d. Explain how Sundreana would determine whether or not to continue operating the business on the basis of these numbers. **In general, she would calculate her economic profit and operate if she makes a least normal profit (meaning zero economic profit). In Sundreana's case, she earns $3,500 in accounting profit minus the $200 implicit cost of capital and the opportunity cost of her time. Because $3,500 - $200 = $3,300, she will make at least normal profit if the opportunity cost of her time is less than or equal to $3,300.**

12. Suppose a firm can sell as many units of output as it wants for a price of $15 per unit and faces total costs as indicated in the table below. Use the optimal output rule to determine the profit-maximizing level of output for the firm.

Q	TC
0	$2
1	$10
2	$20
3	$33
4	$50
5	$71

   The profit maximizing level of output is three units because marginal cost goes from being below marginal revenue at a quantity of three to being above marginal revenue at a quantity of four, thus passing through marginal revenue at the third unit.

13. Use the data in the table provided to answer the following questions:

Quantity (Q)	Total Revenue (TR)	Total Cost (TC)
0	$0	$7
1	$18	$23
2	$36	$29
3	$54	$37
4	$72	$49
5	$90	$65
6	$108	$87
7	$126	$112

a. What is the marginal revenue of the fourth unit? **$18**
b. Calculate profit at a quantity of two. Explain how you calculated the profit. **$7; $36 (TR) - $29 (TC) = $7**
c. What is the profit-maximizing level of output? Explain how to use the optimal output rule to determine the profit-maximizing level of output. **5 units. The optimal output rule states that profit is maximized when MC = MR. Here, MC never exactly equals MR. When this occurs, the firm should produce the largest quantity at which MR exceeds MC. At a quantity of 5, MC = $16 and MR = $18. For the sixth unit, MC = $22 and MR = $18, and because MC>MR, the sixth unit would add more to total cost than it would to total revenue, and it therefore should not be produced.**

14. Jackie owns and operates a Web-design business. Her computing equipment depreciates by $5,000 per year. She runs the business out of a room in her home. If she didn't use the room as her business office, she could rent it out for $2,000 per year. Jackie knows that if she didn't run her own business, she could return to her previous job at a large software company that would pay her a salary of $60,000 per year. Jackie has no other expenses.

a. How much total revenue does Jackie need to make in order to break even in the eyes of her accountant? That is, how much total revenue would give Jackie an accounting profit of just zero?
Jackie's accounting profit is: Total revenue - $5,000. (The only cost that her accountant would add into the accounting profit calculation is depreciation.) For her accounting profit to be just equal to zero, her total revenue would have to be $5,000.

b. How much total revenue does Jackie need to make in order for her to want to remain self-employed? That is, how much total revenue would give Jackie an economic profit of just zero?
Jackie's economic profit is: Total revenue - $5,000 - $2,000 - $60,000 = Total revenue - $67,000. (Depreciation, the opportunity cost of not renting out the room, and the opportunity cost of Jackie's time are all costs that figure into the calculation of economic profit.) For this to be just equal to zero, Jackie's total revenue would have to be $67,000.

15. Using the information below, help Andrea decide exactly how many software programs to produce and sell to make the most profit possible. Use the information provided to fill in the blanks spaces in the chart below and answering the questions that follow.

Andrea has developed a computer software program that she calls *The Homework Helper*. She has programmed in assignments, group projects, and textbook readings for all her classes, as well as relevant Web sites and related on-line research resources. Her program notifies her when assignments are due and exams are coming up, and it also reminds her of school activities, parties, dates for sending in college applications, and birthdays of friends and relatives. And it plays her favorite songs while she works. Ten of Andrea's friends have told her that they would each be willing to pay her $56 if she would set up and adapt her program for them. Andrea could use a little extra money and would like to help out her friends (but maybe not all of them). She is also interested in starting a small computer consulting business and thinks this would be a good way to begin.

# of Programs	TFC	TVC	TC	MC	Price	TR	MR	Profit or Loss
0	$60	$0	$60	---	---	0	---	-$60
1	$60	$45	$105	$45	$56	$56	$56	-$49
2	$60	$85	$145	$40	$56	$112	$56	-$33
3	$60	$120	$180	$35	$56	$168	$56	-$12
4	$60	$150	$210	$30	$56	$224	$56	$14
5	$60	$185	$245	$35	$56	$280	$56	$35
6	$60	$225	$285	$40	$56	$336	$56	$51
7	$60	$270	$330	$45	$56	$392	$56	$62
8	$60	$325	$385	$55	$56	$448	$56	$63
9	$60	$390	$450	$65	$56	$504	$56	$54
10	$60	$465	$525	$75	$56	$560	$56	$35

A. How many software programs should Andrea sell to make the most profit? 8

What would her profit be? $63

What is the marginal revenue for this number of programs? $56

What is the marginal cost? $55

B. If Andrea sold one more software program than your answer in Part A, what would her profit be? $54

What is the marginal revenue for this number of programs? $56

What is the marginal cost? $65

C. What is the relationship between price and marginal revenue? P = MR

D. What is the relationship between marginal cost and marginal revenue at the optimum output? MC=MR