

Past-paper walk-through

Cost-Benefit Analysis ■ 1.5

eXercise

Questions in this set

- 2021 Set 2 Q3
- 2018 Q3

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 3

2021 Set 2 ■ Q3

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

Question 3

7	4,100	4,200
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- (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?

Question 3

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

Solution 3

(a)

Mark scheme

- Total net benefit of placing three advertisements = Total Benefit – Total Cost = \$3,000 – \$800 = \$2,200.

Solution 3

(b)

Mark scheme

- Marginal net benefit of the 3rd advertisement = (Total benefit at 3 ads – Total benefit at 2 ads) – (Total cost at 3 ads – Total cost at 2 ads) = $(\$3,000 - \$2,200) - (\$800 - \$500) = \$800 - \$300 = \$500$.

Solution 3

(c)

Mark scheme

- The optimal number of advertisements is 4. Using marginal analysis: the marginal net benefit of the 4th advertisement is positive ($600 - 500 = 100 > 0$), *so it should be placed*; *the marginal net benefit of the 5th advertisement is negative* ($400 - 800 = -400 < 0$), so it should not be placed. AZY Foods should add advertisements while marginal net benefit is positive and stop once it turns negative, giving 4 ads.

Solution 3

(d)

Mark scheme

- The optimal number of advertisements remains 4. With the marginal benefit of each advertisement up by \$300, the marginal net benefit of the 4th ad becomes $(\$600 + \$300) - \$500 = \400 (still positive, so it is worth placing), while the marginal net benefit of the 5th ad becomes $(\$400 + \$300) - \$800 = -\100 (still negative, so it is not worth placing). AZY Foods should still stop at 4 advertisements.

Solution 3

(e)

Mark scheme

- AZY Foods is operating in a monopolistically competitive market structure: many firms in the retail food market, each independently placing its own firm-specific advertisements without considering the actions of its competitors.

Question 3

2018 ■ Q3

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

Question 3

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

Question 3

- (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?

Question 3

(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.

Question 3

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

Solution 3

(a)

Mark scheme

- Nirali's gain (increase in her expected history score) from the second hour spent studying history is 20 points.

Solution 3

(b)

Mark scheme

- Nirali's opportunity cost of the second hour spent studying history is 6 points (or $6/20$) — the expected microeconomics score she gives up by spending that hour on history instead of microeconomics.

Solution 3

(c)

Mark scheme

- The opportunity cost of studying history increases as Nirali allocates more time to it. Explanation (either): the expected score on microeconomics decreases at an increasing rate with each additional hour spent studying history; equivalently, the marginal cost (in forgone microeconomics score) is rising with each additional hour devoted to history.

Solution 3

(d)

Mark scheme

- To maximize the sum of her expected test scores, Nirali should study 2 hours for microeconomics and 3 hours for history — the allocation where the marginal (expected-score) benefit of an additional hour is equalized across the two subjects.

Solution 3

(e)

Mark scheme

- Nirali will allocate the additional freed-up hour to studying microeconomics. Explanation (marginal analysis): starting from the allocation in part (d), spending the extra hour on microeconomics increases her expected total score by 8 points, compared to only 5 points if the hour were spent on history instead — since the marginal benefit of microeconomics (8) exceeds the marginal benefit of history (5), she should study microeconomics.