Microeconomics (MEM) Problem Set

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The Problem Set contains two types of question.

- Some are pretty straightforward. They are narrow, numerical exercises with a single correct answer, and the aim is to sharpen thinking about the basic economic tool kit.
- Some are more open ended. They are broader and give you the opportunity to think creatively about using economic theory to understand practical issues.

Session 1

Question 1.1

Imagine that a company has a policy of awarding a bonus equal to 10% of the value of every good idea initiated. An employee thinks that this is such a good idea, he helps his boss to write a book explaining why it will prompt even more good ideas. If the company believes that the value of this book is £120,000, and that it was genuinely the result of this employee's actions (and only this employees actions), how much should he receive as a bonus? What is the corporate marginal tax rate of good ideas in this instance?

Question 1.2

In what ways do Cigarettes and Facebook compete with each other?

Question 2.1

Consider *Markets for Managers*, Ch. 2.1

Imagine that you are given a choice between three banknotes:

a. £50

b. £20

c. £10

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What is the cost of choosing the £20 note?

Question 2.2

Use the table below, and assuming a cost of capital of 12%, which business unit is generating an economic loss?

Business unit	**Annual budget**	**After-tax income (NOPAT)**	**Economic profit/loss**
A	£100,000	£14,000	
B	£200,000	£20,000	
C	£20,000	£4,500	

+ Discussion Question 1b

Provide an interesting and original example of a company that has suffered due to risk compensation (i.e. the "Peltzman effect").

+ Discussion Question 1d

Create a list of 3-6 products or services that you sell and explore the different sources of value creation. Demonstrate a thorough understanding of the customer's needs that are being satisfied.

+ Discussion Question 1e

Provide an example of what you consider to be a managerial error that you have encountered as a student at ESCP Europe. (i) Identify the decision maker; (ii) did they face the right incentives? (iii) did they have sufficient knowledge? Suggest a way of avoiding a similar error in future by aligning incentives and/or improving knowledge flows.

+ Discussion Question 2a

Provide a real, detailed, and original example of the following:

a. A sunk cost that should have been ignored but wasn't
b. An opportunity cost that shouldn't have been ignored but was

Session 2

Question 2.3

Find the expression for the average fixed cost, average variable cost, and average cost functions where the total cost function is:

a. $TC = 3 + 4q$
b. $TC = 10 + q^2$
c. $TC = 100 - 3q + 10q^2$

Source: Schotter, Ch. 10, Ex. 3

Question 2.4

Mutual Industries owns three plants at which it produces exactly the same cars. Plant 1 has cost function $TC_1 = 300 - 10q + 50q^2$. Plant 2 has cost function $TC_2 = 50 + 10q^2$, and plant 3 has cost function $TC_3 = 1{,}000 + 20q$. Mutual decided to produce 5 cars in the least costly way. Which plant will be chosen? Find its cost.

Source: Schotter, Ch. 10, Ex. 4

Question 2.6

Consider "La Marmotte", January 2012.

Firstly, what is the highest amount of profit that the restaurant could earn? How many meals should they produce? Then, draw a rough graph to show the level of output consistent with profit maximisation.

Output	Costs						Revenue			Profit
daily	VC	FC	TC	AVC	ATC	MC	MR	AR	TR	π
66	164	500					30	30		
67	193	500					30	30		
68	224	500					30	30		

Question 2.7

Consider "La Marmotte", January 2012.

The variable costs for *La Marmotte* are given by the following equation:

$$AVC = q^{1.05} - 140 + \left(\frac{4000}{q}\right)$$

Calculate the profit maximising level of output.

+ Discussion Question 2b

Consider the case *Dogfight over Europe: Ryanair (A)*. What were some of the ways in which economies of scale gave British Airways an advantage over new entrants back in 1986?

Session 3

Question 3.1

Consider *Markets for Managers*, Ch. 3.1.

Draw Anne and Bert's marginal value diagrams. Make sure you introduce the middleman, and show how this generates consumer surplus *and* producer surplus. Spot the error in the book.

Hint: See the video, "Eggschange", April 2014.[1]

Question 3.2

Assume that the market demand curve is $Q_D = 40 - 2p$ and the market supply curve is $Q_S = 4p - 20$

a. Find the equilibrium price and quantity.
b. Calculate the consumer surplus and producer surplus.
c. Suppose the government imposes on each firm a \$3 tax on each unit sold. What is the new equation for the supply curve?
d. Calculate the new price and quantity.
e. What is the price received by the producer?
f. Find the tax revenue of the government and calculate how much is paid by the consumer and how much by the producer.
g. How much consumer surplus has been lost?
h. How much producer surplus has been lost?
i. What is missing?

Source: Lynne Kiesling, Northwestern University

[1] http://www.youtube.com/watch?v=Z24kajeNtV8

Question 3.4

Use comparative statics to show why house prices have increased so much over the last few years. Also, how will the following events influence the price and quantity of housing over the next 10 years?

a. A new government relaxes planning laws on greenbelt land

b. The UK Border Agency engages in a major clampdown on illegal immigrants

c. The divorce rate spikes upwards

d. The economic downturn becomes a severe depression

Hint: See the video, "Comparative statics and the UK housing market", April 2014.[2]

Question 4.1

Imagine a firm wants to increase the total revenue that it makes from a particular product. What must they do to their price?

a. If the demand is elastic they should *lower* the price and also if the demand is inelastic they should *lower* the price

b. If the demand is elastic they should *lower* the price but if the demand is inelastic they should *raise* the price

c. If the demand is elastic they should *raise* the price but if the demand is inelastic they should *lower* the price

d. If the demand is elastic they should *raise* the price and also if the demand is inelastic they should *raise* the price

Question 4.2

Consider "An Economists Passage to India", February 2012.

At the entrance to Humayun's Tomb the sign says: "Citizen of India" pay 20 rupees whilst "Others" pay 300. They have 200 local visitors a month, and five times as many tourists. Imagine that they're planning on raising the tourist price by 25%. They anticipate that 40 fewer people will visit.

a. What is the price elasticity?

b. What is the increase in the revenue received from tourists?

[2] http://youtu.be/sSxGMwMEyWc

Question 4.3

Virgin Atlantic have done some research and forecast that the average income of its customers will rise by 4% next year. They also believe that the income elasticity of demand for Premium Economy flights to India is 3.8.

a. If they currently sell 30,660 tickets (with an average ticket price of £1,100) calculate next years revenue.
b. Should they use the same estimate of the income elasticity of demand for standard Economy or Upper Class seats?

Question 4.4

If the cross-price elasticity of Good A is 0.45 (with respect to good B), Good A is a:

a. Elastic
b. Normal
c. Substitute
d. Complement

Question 4.5

At a student café, there are an equal number of two types of customers. The table below shows the marginal value that they place on two different goods. The café owner cannot distinguish between the two types of students because many students without early classes arrive early anyway (i.e., she cannot price discriminate).

	A Students with early class	**B** Students without early class
Coffee	70	60
Banana	50	100

The MC of a coffee is 10. The MC of a banana is 40. Is bundling more profitable than selling separately? If so, what price should be charged for the bundle? What about a mixed strategy of offering a bundle and a separate price?

Source: Froeb, McCann et al., Ex. 14.6

+ Discussion Question 3a

Provide a real example of a city that has adopted rent control. Use comparative statics to show the theoretical effect rent control on the market for rental accommodation. Make sure you label the market rate of rent that would exist without the price ceiling. List some of the possible unintended consequences of such a policy. Is there evidence that any of these unintended consequences occurred?

Hint: *Markets for Managers*, Ch. 3.2.

+ Discussion Question 4b

Imagine you work for a company that currently charges the same price for its product to all customers. Your manager has asked you to write a brief report explaining the concept of price discrimination. Use the airline industry to (i) explain why companies use price discrimination; (ii) provide concrete examples of techniques that they use.

Session 4

Question 3.8

Explain how adverse selection and moral hazard apply to an all-you-can-eat buffet.

Question 3.9

Suppose that a person wants to buy a used car. She knows that half of the available used cars are good cars and the other half are "lemons". She is willing to pay $10,000 for a good car and $2,000 for a lemon.

a. Assume that this buyer cannot distinguish the good cars from the bad cars. How much would she be willing to pay for any car?
b. What types of car will be offered for sale in the market at the price calculated in part a?
c. Based on your answer in Part b, calculate the ultimate equilibrium price of a car in the used-car market.

Source: Schotter, Ch. 23, Ex. 2

Question 3.10

Imagine a market where there are 8 buyers (who can buy a maximum of one unit each) and 6 sellers (who can sell a maximum of two units each). There is a Grade 4 (i.e. high quality) product available. Assume that the buyers place a value of £24 on the product. It costs £14 to produce the 1st unit, and £1 more to produce the 2nd unit. Draw the demand and supply diagram and clearly mark the equilibrium price.

Question 3.6

In 2013 the UK government auctioned off 2 licenses for providing 4G mobile phone services. The table below shows the bids that were made:[3]

Company	**Bid**
Everything Everywhere Ltd	£588m
Hutchison 3G UK Ltd	£225m
Niche Spectrum Ventures Ltd (a subsidiary of BT Group plc)	£187m
Telefónica UK Ltd	£550m
Vodafone Ltd	£791m

If the government operates a second-price sealed bid (i.e. “Vickrey”) auction with uniform pricing, answer the following questions:

a. Which companies win the licenses?
b. How much do they each have to pay?
c. Do either company generate consumer surplus?
d. Briefly explain why companies will bid more honestly in this type of auction rather than under a *first* price sealed bid auction.

+ Discussion Question 3d

To what extent is there an asymmetric information problem between your company and your customers? Use an example of a product you sell that consumers will not be able to detect the quality of before they buy it. What are some of the methods you may use to resolve this problem? Do warranties always signal quality?

[3] Assume that these are the bidder’s marginal valuation of the license. See http://media.ofcom.org.uk/news/2013/winners-of-the-4g-mobile-auction/

Session 5

Question 5.6

Consider the following game in which player 1 chooses a row and player 2 choose a column.

	L	**C**	**R**
T	3, 1	0, 5	1, 2
M	4, 2	8, 7	6, 4
B	5, 7	5, 8	2, 5

a. Does player 1 have a dominant strategy?
b. Does player 2 have a dominant strategy?
c. What is the Nash equilibrium for this game? Is it *ever* possible for either player to use a strategy other than his dominant strategy? Explain

Hint: See the video, "An Introduction to Game Theory", February 2015.[4]

Source: Schotter, Ch. 11, Ex. 7

Question 5.7

Consider the following matrix, which shows the payoffs for a game between two firms in a duopolistic industry.

		Firm II	
		Low price	**High price**
Firm I	**Low price**	0, 0	20, -8
	High price	-8, 20	5, 5

a. What is the only Nash equilibrium in pure strategies for this game?
b. Are there dominant strategies for each firm?
c. Now suppose that the cost structure in the industry has changed so that the new payoffs for the game are as shown below. Is the Nash equilibrium determined in Part a of this problem still an equilibrium?

		Firm II	
		Low price	**High price**
Firm I	**Low price**	0, 0	0, -10
	High price	-10, 0	5, 5

d. Are there now any other equilibria?

[4] https://youtu.be/YndXmFGaRmU

e. If there are now several equilibria for the game, which one do you think is likely to be chosen? Why?

Hint: See the video, “An Introduction to Game Theory”, February 2015.[5]

Source: Schotter, Ch. 19, Ex. 9

Question 5.8

a. Is the bar scene from “A Beautiful Mind” a Nash equilibrium?[6]
b. Is the boat scene from “The Dark Knight” a Prisoner’s Dilemma?[7]

Question 5.5

The table below shows profits of two companies in the same market producing perfect substitutes.

	My partner's output										
My output	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0	0	0	0	0	0	0	0	0	0	0	0
1	11	10	9	8	7	6	5	4	3	2	1
2	20	18	16	14	12	10	8	6	4	2	0
3	27	24	21	18	15	12	9	6	3	0	-3
4	32	28	24	20	16	12	8	4	0	-4	-8
5	35	30	25	20	15	10	5	0	-5	-10	-15
6	36	30	24	18	12	6	0	-6	-12	-18	-24
7	35	28	21	14	7	0	-7	-14	-21	-28	-35
8	32	24	16	8	0	-8	-16	-24	-32	-40	-48
9	27	18	9	0	-9	-18	-27	-36	-45	-54	-63
10	20	10	0	-10	-20	-30	-40	-50	-60	-70	-80

Identify:

a) The price and profit in a situation of a shared monopoly
b) The equilibrium under Cournot competition

[5] https://youtu.be/YndXmFGaRmU
[6] A Beautiful Mind, February 2008 https://www.youtube.com/watch?v=uAJDD1_Oexo
[7] Joker’s Social Experiment, December 2010 https://www.youtube.com/watch?v=K4GAQtGtd_0

+ Discussion Question 5a

Imagine your company is locked into a Prisoner's Dilemma and collusion isn't an option. Outline some strategies you may take and how effective they are.

Provide a real-world example of the Prisoner's Dilemma (PD). Mention three possible strategies to escape from the PD, and discuss how you think it can be solved.