

Assignment 1

Due in tutorial in the week of September 22nd

Do **Problem 16 from Chapter 4** (5 marks)

Problem 1 (5 marks) Janet has the following demand curve for oatmeal $Q = 10 - 2P$, where P is price per pound and Q is pounds of oatmeal she purchases every month.

- (a) Suppose that price of oatmeal in her local grocery store is 3 dollars/pound. How many pounds will Janet buy at this price? Find Janet's total expenditure on oatmeal, her consumer surplus and the total value of the quantity that she will buy at that price. Show your results on a diagram.
- (b) Suppose next to the grocery store there is a store called 'Save on Oats' that sells oatmeal for \$1.50 per pound, but in order to shop there Janet has to buy membership which costs 5 dollars per month. Should Janet purchase the membership? Be careful, this is a trick question.

Problem 2 (5 marks) Consider the following demand function: $P = 10 - .5Q$. Calculate TR and elasticity of demand when price is equal to 9, 7.5, 5, 2.5 and 1. Show your results on diagrams with the demand curve and a plot of TR against Q . (2 marks)

If you did not make a calculation mistake you should observe the result that when demand is elastic decrease in price will increase the total revenue. Use the concept of elasticity to explain in your own words *why* this happens. (3 marks)

Problem 3 (5 marks) Initially Killer Pizza charges $P = 1.25$ per slice of pizza is selling 30 slices of pizza per hour. Consider parts (a) and (b) to be independent changes.

- (a) When the neighbouring internet cafe decreased price of their services from 5 to 4 dollars per hour the quantity of pizza sold by Killer Pizza increased to 39 slices per hour. Calculate cross price elasticity of the demand for pizza. Are pizza and internet services complement or substitute goods?¹
- (b) Suppose that due to inflation real income of customers falls from 25,000 to 22,500, after which the quantity of pizza sold increases to 36 slices per hour. What is the income elasticity of demand for pizza? Is pizza a normal or an inferior good?

¹In order to avoid confusion with the numbers you can do the following. Denote pizza as good 1, then the quantities before and after price change are Q_1^0 and Q_1' . Internet services is good 2, denote the initial and final price as P_2^0 and P_2' . For calculations use formula for arc elasticity and the initial point.

Hints and Suggestions

Hint for problem 1 part (b): this question is based on a similar reasoning as Pr. 25 from Ch. 4. The intuition behind the consumer surplus is “the extra welfare” from being able to purchase the good at a certain price per unit that comes from the idea that the MV of all units (except the one for which $MV=P$) consumed is higher than the price that she pays, therefore she has net welfare gains on each unit. Of course ‘Save on Oats’ offers price lower compared to the local grocery store, Janet will buy more oats and will have a higher consumer surplus, but paying the membership fee will reduce her net welfare she gets from shopping there. In order to answer the question you need to find whether after paying the membership fee Janet will still have CS higher than what she gets when shopping at the local grocery store and paying \$3 per pound.

Note on equations, slopes and elasticity. Look at Pr. 13 on p.105 of the textbook. The demand is given in the form $Q = 14 - P$, which gives you quantity as a function of price. When you plot this demand on a diagram you need price to be on the left hand side of the equation (because price is on the vertical axis), so when you plot this demand curve you single out price $P = 14 - Q$. Notice that for this particular demand curve the slope is -1 whichever way you write it, however it is not always the case.

If for calculation of elasticity you want to use formula $E = \frac{1}{\text{slope-of-the-demand}} \cdot \frac{P}{Q}$ you should remember that in this case the slope of the demand refers to the equation in the form $P = a - bQ$. This did not affect your calculations for Pr. 13, but if the slope of the demand is not equal to 1 you have to be careful which slope you use.

For example in the Pr. 2 of the assignment I could write the demand equation as $Q = 20 - 2P$. In this case, if you want to use the ‘one over the slope of the demand curve’ you have to rearrange the equation to bring P to the left hand side $P = 10 - .5Q$. Please make sure you understand this point and if it seems confusing please see me or your TA during the office hours.

If you use $\frac{\Delta Q}{\Delta P}$ between any two points on a linear demand curve you will never get it wrong. If slopes are confusing you might go with this approach, just pick two points on a curve, calculate the differences and substitute into the formula $E = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$.

Suggestion for problem 2: you can build your explanation of the relationship between elasticity and TR around the following lines. What does elasticity measure (not in the sense of percentage changes, but what is the intuition behind this concept)? What happens when price decreases? What are the two counteracting effects of the price decrease on the TR? How does elasticity determine the relative magnitude of these effects?

Something to think about. Does the value of elasticity depend on the measuring units? Would your calculations for Pr. 3 (a) change if the Internet cafe was initially charging 1.25/15 minutes and then lowered price to 1 dollar per 15 minutes? Would your calculations change for part (b) if income was measured in thousands $M_0 = 25$ and $M' = 22.5$? Why?