

METU, Department of Economics

ECON 201 – Problem Set 1

- 1- Zach and Edward are talented eighteenth-century painters. The world's stock of Zach's paintings is 100 and the world's stock of Edward's paintings is 70. The demand for each painter's work depends on its own price and the price of the other painter's work. If P_z is the price of Zach's paintings (assume all paintings of the same painter is identical in quality) and P_e is the price of Edward's paintings, the demand function for Zach's paintings is $101 - 3P_z + 2P_e$ and the demand function for Edward's paintings is $72 + P_z - P_e$. What are the equilibrium prices for Zach's and Edward's paintings?
- 2- Jean, Emma, and Kurt are all buyers of widgets. Jean's demand function is $Q_j = 520 - 13P$, Emma's demand function is $Q_e = 40 - P$, and Kurt's demand function is $Q_k = 200 - 5P$. Together, these three constitute the entire demand for widgets. At what price will the price elasticity of market demand be -1?

3- Consider the following demand function:

$$Q = \beta P^\alpha$$

(a) Find the conditions on α and β for which the demand curve makes sense, i.e. Q is decreasing in P .

(b) Find the price elasticity of demand. Does it depend on Q or P ? Explain.

4- Consider the following market demand and supply functions:

$$Q_D = D(P, \alpha), \quad Q_S = S(P, \beta)$$

where α and β denote variables which shift demand and supply curves, respectively (e.g. $\alpha = \text{income}$, $\beta = \text{input costs}$).

Assuming that equilibrium is preserved and β is kept constant, derive the following equation:

$$e_{P,\alpha} = \frac{e_{D,\alpha}}{e_{S,P} - e_{D,P}}$$

where $e_{P,\alpha}$ gives the percentage change in equilibrium price in response to percentage change in α and $e_{D,\alpha}$ is the elasticity of demand with respect to α .

5- Answer the following questions by drawing the associated budget sets.

- a) Felicity is studying economics and political science. She can read 30 pages of political science per hour but only 5 pages of economics per hour. This week she has a 50-page assignment in economics and a 150-page assignment in political science. Because of sorority rush, she cannot devote more than 10 hours to studying these subjects this week. She realizes she cannot complete all of her assignments but is determined to complete at least 30 pages of her economics reading. Draw a graph with pages of economics on the horizontal axis and pages of political science on the vertical axis. On this graph, show the possibilities that are consistent with the constraints that Felicity has imposed on herself. (She is allowed to read ahead in either subject.) Label key points on your graph with their numerical values.
- b) Brenda likes hot dogs and Coca-Cola. Hot dogs cost \$1 each and Cokes cost \$.50 per bottle. There is a special promotion for Coke that will last for one month. If Brenda sends in the bottle tops from the Cokes she drinks during the next month, she will get a refund of \$.20 for every bottlecap beyond the first 12 that she returns. For example, if she returns 25 bottle caps she will get back $\$2.60 = \$.20(25 - 12)$. Brenda has \$40 to spend on hot dogs and Coke during the next month. Draw her budget line with Coke on the horizontal axis and hot dogs on the vertical axis. Find the points where the budget line hits the axes and the point where it has a kink. At each of these three points write down the quantities of each good consumed.

- c) Ed Moore and his family live in a city with many private schools and one public school. The Moores are thinking of sending their only child to private school because they would like a school that has more teachers and other resources per student than the local public school. The Moores must pay taxes to support local public schools whether or not their child goes to private school. There is such a variety of private schools that the Moores can get just about any level of inputs per student by choosing the appropriate private school. Tuition in the private schools equals expenditure per student. Draw a diagram to show the Moores' budget constraint. Put expenditures per student in the child's school on the horizontal axis and other goods on the vertical.

6- True/False

- a) If there are two goods with positive prices and the price of one good is reduced, while income and other prices remain constant, then the size of the budget set is reduced.
- b) If good 1 is measured on the horizontal axis and good 2 is measured on the vertical axis and if the price of good 1 is p_x and the price of good 2 is p_y , then the slope of the budget line is $-p_y/p_x$.
- c) There are two goods. You know how much of good 1 a consumer can afford if she spends all of her income on good 1. If you knew the ratio of the prices of the two goods, then you could draw the consumer's budget line without any more information.
- d) In year 1, the price of good x was \$4, the price of good y was \$1, and income was \$70. In year 2, the price of x was \$9, the price of good y was \$2, and income was \$80. On a graph with x on the horizontal axis and y on the vertical, the new budget line is steeper than the old one and lies below it.

- e) Suppose there are two goods. If you could exactly afford either 2 units of x and 7 units of y , or 4 units of x and 3 units of y , then if you spent all of your income on y , the maximum unit of y you can buy is