ECON 4010/6010–001
INTERMEDIATE MICROECONOMICS/MICROECONOMICS

Marcio Santetti | Fall 2021

Problem Set 2

Instructions: This Problem Set covers topics from our *Demand curves* lectures. Recall that there is no need to turn in this assignment.

Problem 1

Assuming an increase in a consumer's income:

(a) Sketch budget constraints and indifference curves for a bundle where X is an inferior good, and Y is a normal good.

(b) Sketch budget constraints and indifference curves for a bundle where X is a normal good, and Y is an inferior good.

(c) Sketch budget constraints and indifference curves for a bundle where X and Y are both normal goods.

Problem 2

From Problem 1, sketch the *Engel curves* for both goods.

Problem 3

Show graphically that a bundle *cannot* contain two inferior goods. Explain your reasoning.

Problem 4

In class, we have gone through a visual analysis to define two goods as *substitutes* or *complements* when the price of one good changes. Now, recall the graph we constructed in class to visually analyze income and substitution effects, using an "imaginary budget constraint." The figure below may help you remember that.

This time, your task is to define whether goods X and Y are *normal* or *inferior*. The black line BC_0 represents the initial budget constraint at original prices, and a consumer maximizes her utility at point A. Then, the price of good X falls, twisting the budget constraint to BC_2.

Point B represents the point where the imaginary budget constraint BC_i is both parallel to BC_2 and tangent to the original indifference curve. Given this information, draw indifference curves at points C, D, E, F, and G, and define whether X and Y are normal or inferior goods at each maximization point.
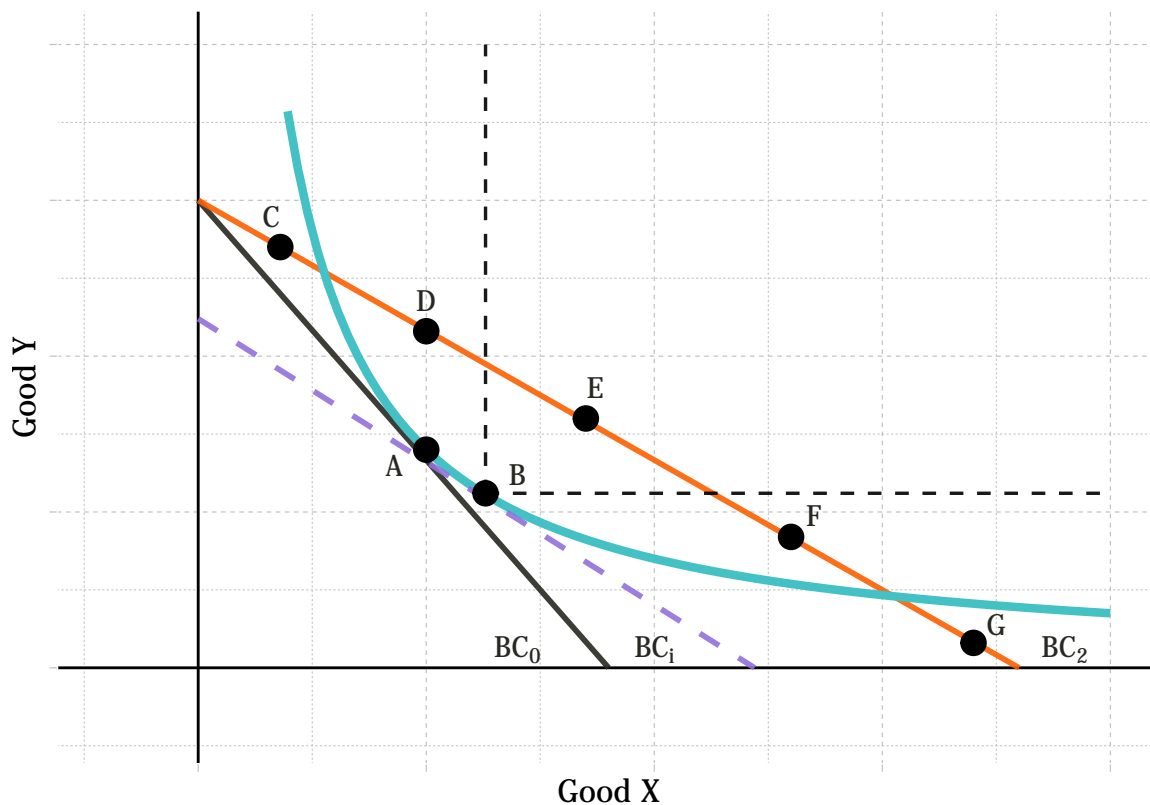
Good X

Problem 5

Suppose a consumer only consumes two goods, X and Y. You are given the following information:

- Her price elasticity of demand with respect to good X (e_{X,P_X}) is -.5.
- Her cross-price elasticity with respct to good X (e_{X,P_Y}) is -0.9.

Find this consumer's income elasticity of demand for good X ($e_{X,I}$). **Hint**: A 10% *increase* in income is equivalent to a 10% *fall* in the price of both goods X and Y.

Problem 6

Suppose there are two types of consumers in an economy where only pizzas (Z) and salads (S) are consumed. Type A and Type B consumers have the following functions representing the quantity demanded for pizzas, respectively:

$$Z_A = \frac{I_A}{P_Z + P_S} \qquad Z_B = \frac{I_A}{P_Z + 3P_S}$$

where I_i is income ($i = A, B$), and P_Z and P_S are the prices of pizzas and salads, respectively. Lastly, there are 4 consumers of each type in the entire economy.

(a) Based on the demand functions for each consumer type, are pizzas normal or inferior goods?

(b) Based on the demand functions for each consumer type, are pizzas and salads complements or substitutes?

(c) Which consumer type has a higher income elasticity of demand for pizzas? Explain.

(d) Now assume that consumer A's income is $100 and B's is $200. Also, the unit price of salad is $3. Derive an expression for the *market demand* for pizzas as a function of pizza prices.