

ECON 201 - Problem Set 5

1. Benjamin spends his time either watching movies (x_1) on Netflix or listening to songs on Spotify (x_2). His preferences are described by $U(x_1, x_2) = \ln(x_1) + \ln(x_2)$. Answer the following questions:
 - (a) Derive Benjamin's demand for movies and songs as a function of prices p_1, p_2 and his income m .
 - (b) Fix the price of songs at $p_2 = 1$, and income at $m = 10$. Find the price offer curve (give an exact formula $x_2 = f(x_1)$) and plot it in the commodity space. Find the demand curve $x_1 = f(p_1)$ and plot it in the graph (with p_1 on vertical axis and x_1 on horizontal axis).
 - (c) Is x_1 an ordinary good or a Giffen good? Explain.
 - (d) Now fix $p_1 = 1$ and $p_2 = 1$. In the commodity space, plot the income offer curve. In addition, in two separate graphs, plot Engel curves for both movies and songs. Argue that the two commodities are normal (not inferior).
2. Consider Trevor from our previous problem set who begins his day with strawberry milkshake. To prepare it, he mixes milk, x_1 , strawberries x_2 and does so always in his favorite proportion: 1 glass of milk to 2 strawberries. What is his utility function? Answer all the questions from Problem 3, from (a) to (d), using these preferences.
3. Kate's preferences are defined over consumption of two types of apples: Red Delicious (x_1) and Jonagold (x_2), $U(x_1, x_2) = 2x_1 + x_2$. Answer all the questions from Problem 3, starting from (a) to (d) using these preferences.
4. Consider a consumer with utility function

$$u(x_1, x_2) = x_1^{1/3} x_2^{2/3}.$$

- (a) Derive the Marshallian demand functions for x_1 and x_2 as functions of (p_1, p_2, m) .
 - (b) Fix $p_2 = 1$ and $m = 30$. As p_1 varies, find the price offer curve (give a formula relating x_2 to x_1) and plot it in the commodity space. Also find and plot the demand curve for x_1 (with p_1 on the vertical axis).
 - (c) Is x_1 an ordinary good or a Giffen good? Explain.
 - (d) Now fix $p_1 = 1$ and $p_2 = 1$. In the commodity space, plot the income offer curve. In addition, plot Engel curves for both goods and discuss whether they are normal or inferior.
5. A consumer has utility

$$u(x_1, x_2) = x_1 + \sqrt{x_2},$$

and faces the budget constraint $p_1 x_1 + p_2 x_2 \leq m$, $x_1, x_2 \geq 0$, with $p_1, p_2, m > 0$.

- (a) Assuming an interior solution, derive the Marshallian demand functions for x_1 and x_2 as functions of (p_1, p_2, m) .

- (b) Fix $p_2 = 1$ and $m = 20$. As p_1 varies, obtain the price offer curve and describe it in the commodity space. Derive the demand curve for x_1 and comment on its shape.
- (c) Is x_1 an ordinary good or a Giffen good? Explain, paying attention to how x_1 changes with p_1 .
- (d) Now fix $p_1 = 1$ and $p_2 = 1$. Derive the income offer curve and the Engel curves for both x_1 and x_2 . Discuss whether each good is normal, inferior, or neither.