ECON 251: Problem Set 3

Due Friday September 30 by 11:00 PM

Instructions. Each part of a problem is worth one point (so Problem 1 is worth six points in total, but all other questions are worth one point). Don't forget to answer Problem 4 and Problem 5, as they ar each worth one point. Unless otherwise stated, you can always assume that goods are continuously divisible: there is no need to consume an integer number of units of any good. Once you have finished, please submit your completed problem set on gradescope. To do this, you will either need to upload a pdf of your entire problem set or an image (for example, a picture that you take with your phone) of your work for each problem. If you upload a pdf, you will need to tag each problem on the appropriate page of the document. Please show your work and draw a box around your final answer. You are free to work together with your classmates, but the work that you upload must be your own.

1. Suppose demand for Good 1 is given by

$$x_1(p_1, p_2, m) = p_2 m / \left(p_1 p_2 + p_1^2\right)$$

and demand for Good 2 is given by

$$x_2(p_1, p_2, m) = p_1 m / \left(p_1 p_2 + p_2^2\right)$$

The price of Good 1 rises from $p_1^0 = 1$ to $p_1^1 = 2$. The price of Good 2 is held constant at $p_2 = 2$, and the size of the budget is held constant at $m = 80$.

   (a) How much of Good 1 does the decision-maker consumer before the price increase?
   (b) How much of Good 2 does the decision-maker consumer before the price increase?
   (c) If the price increase from $p_1^0 = 1$ to $p_1^1 = 2$ were a compensated price change, how large would the budget new (m^c) need to be?
   (d) Calculate the substitution effect.
   (e) Calculate the total change in demand.
   (f) Calculate the income effect.

2. Consider the demand function for consumption bundles in $\boldsymbol{R}_+^2$:

$$x(m, p_1, p_2) = \begin{bmatrix} x_1(m, p_1, p_2) \\ x_2(m, p_1, p_2) \end{bmatrix} = \begin{bmatrix} m/(p_1 + p_2) \\ m/(p_1 + p_2) \end{bmatrix}$$

The price of Good 1 rises from p_1^0 to $p_1^1 > p_1^0$. The price of Good 2 remains fixed at $\bar{p_2}$ and the size of the budget remains fixed at $\bar{m}$. Show that the substitution effect is zero.

3. Consider consumption bundles over two goods: bundle $x = (x_1, x_2) \in \boldsymbol{R}_+^2$. Show that if demand satisfies the adding up restriction and Good 1 is an inferior good, Good 2 must be a normal good.

4. Which of your classmates did you work with on this problem set?

5. Did you attend Jamie's TA office hours, or get help from her over email or outside of her regular office hours?