Economics 3010
Intermediate Microeconomics, Fall 2017

Problem Set 2

The following questions are meant to demonstrate your basic understanding of the topics covered. Answer the following questions demonstrating your knowledge.

Cobb Douglas

1. Let I, p_x and p_y represent income and prices. Suppose $U(x, y) = x^a y^b$ where $a, b > 0$.
   (a) Calculate the MRS.
   (b) Find the optimal bundle and use a graph to depict the optimum.
   (c) Calculate the elasticity of demand for good x and for good y.
   (d) Calculate the cross price elasticity for good x and for good y.
   (e) Calculate the income elasticity for good x and for good y.
   (f) Solve and graph the Engel Curve, Demand Curve, PCC, ICC.

Perfect Substitutes

2. Let I, p_x and p_y represent income and prices. Suppose $U(x, y) = ax + by$ where $a, b > 0$.
   (a) Calculate the MRS.
   (b) Find the optimal bundle and use a graph to depict the optimum.
   (c) Calculate the elasticity of demand for good x and for good y.
   (d) Calculate the cross price elasticity for good x and for good y.
   (e) Calculate the income elasticity for good x and for good y.
   (f) Solve and graph the Engel Curve, Demand Curve, PCC, ICC.

Perfect Compliments

3. Let I, p_x and p_y represent income and prices. Suppose $U(x, y) = min\{ax, by\}$ where $a, b > 0$.
   (a) Calculate the MRS.
   (b) Find the optimal bundle and use a graph to depict the optimum.
   (c) Calculate the elasticity of demand for good x and for good y.
   (d) Calculate the cross price elasticity for good x and for good y.
   (e) Calculate the income elasticity for good x and for good y.
   (f) Solve and graph the Engel Curve, Demand Curve, PCC, ICC.

Quasi-Linear

4. Let I, p_x and p_y represent income and prices. Suppose $U(x, y) = -x^{-1} + y$ where $a, b > 0$.
   (a) Calculate the MRS.
   (b) Find the optimal bundle and use a graph to depict the optimum.
   (c) Calculate the elasticity of demand for good x and for good y.
   (d) Calculate the cross price elasticity for good x and for good y.
   (e) Calculate the income elasticity for good x and for good y.
   (f) Solve and graph the Engel Curve, Demand Curve, PCC, ICC.

Demand and Income

5. Vikram has an income of I and likes to consume mangos and pears. Vikram faces prices of p_a and p_b for mangos and pears respectively. Vikram's utility function for mangos and pears is $U(a,b) = ln(a)+2ln(b)$.
   (a) Solve for Vikram's optimal bundle given this information. Fully characterize the solution.
   (b) Let $p_a = 1$ and $p_b = 4$. Give the equation for the Engel curve as well as the optimal values of a and b in terms of I. Graph both the Engel curve and income consumption curve using the same kind of two-panel diagram that was used in class.
   (c) Let $I = 4$ and $p_b = 4$. Give the equation for the demand curve as well as the optimal values of a and b in terms of I. Graph both the demand curve and price consumption curve using the same kind of two-panel diagram that was used in class.