Problem Set 1

Due: February 1st, 2016 at 10:00am.

Please answer the following problems legibly on a separate piece of paper. List any other members of the class you worked with on this assignment. You will not be penalized for listing classmates' names, rather, group-work is encouraged. Remember to make a copy of your answers for your records. The answer key will be posted on Blackboard at 10:01pm on February 1st. Note: "Nechyba" indicates problems that come from Nechyba's Microeconomics:An Intuitive Approach (not the calculus version).

1. Assume Marginal Utility of cleaner air is given by

$$MU = 1000 * \frac{1}{PPM}$$

Where utility is expressed in dollars ($), and PPM is the amount of pollution (expressed in parts per million of the pollutant) that has been removed from the air.

a) Sketch the Marginal Utility curve of cleaner air.
b) On a separate graph, sketch the Total Utility curve (Hint: Do not worry about translating from marginal to total – that would take an integral – use what you see in (a) to form an answer to b)).
c) Suppose the cost of reducing pollution by 1 PPM is always $10. What is the optimal amount of pollution? Why doesn't this economy want completely clean air?

2. Buck Mulligan loves two things: Irish literature and soccer. Buck has $120 to spend, an Irish novel costs $4 and a ticket to see a soccer match costs $6.

a. Draw Buck's budget constraint (assume Buck can consume fractions of a unit).
b. Buck's hometown team, The Bray Wanderers, offer a season ticket for all 20 home games. The season ticket costs $90. Show what this does to Buck's constraint.

3. Assume that Charlie can consume only delicious, nutritious smoothies and/or stinky, rotting, disgusting garbage.

a. With garbage on the vertical axis and smoothies on the horizontal, draw a few of Charlie's indifference curves. Explain why they have the slope that they do.

b. Assuming diminishing marginal utility in both smoothies and garbage, does it matter which axis is labeled "smoothies" or "garbage"? That is, do the indifference curves have same general shape when labels of the axis are switched?

4. John has an income of $80 per week, all of which he spends on grapes (G) and tortillas (T). The price of grapes is $2 per pound and the price of tortillas is $4 per box. His utility function is U = 5(GT).

a. Give the equation of John's budget constraint

b. Plot this relationship (and please make your graph large). Put the quantity of grapes on the horizontal axis and the quantity of tortillas on the vertical.

c. What is the value of the slope of the line you have drawn?

d. Give a written economic interpretation of this slope

e. In your graph from part b., carefully plot John's indifference curves for U = (250, 500, 1000, and 1500) (four curves in all). Label each curve.

f. Assuming John is a utility maximizer, how many grapes and tortillas does he consume per week?

g. Suppose the price of grapes rises to $4 per pound, ceteris paribus. Draw his new budget line in your graph. What are the utility maximizing consumption quantities of grapes and tortillas?

5. Nechyba: End-of-chapter exercise 6.1 (all parts).

Extra Credit: After completing 6.1 answer the related questions:

i. Now suppose that Ellie's and Jenny's tastes could be described by the utility function $u(x_1,x_2)= x_1^{\alpha} x_2^{1-\alpha}$ where x_1 represents toy cars and x_2 represents princess toys, and $0 < \alpha < 1$. What must be the value of α for Ellie (given the information from 6.1 about the girls)? What must the value be for Jenny?

ii. If all prices of toys are set to $1, what exactly will Ellie do? What will Jenny do?

6. Nechyba: End-of-chapter exercise 7.4