Problem Set # 5

Unless told otherwise, assume that individuals think that more of any good is better (that is, marginal utility is positive). Also assume that indifference curves have their "normal" shape, that is, the MRS becomes "flatter" as you move along the x axis for any indifference curve.

1. Suppose a consumer has income of 10, and buys soda pop and movies. The price of each good is 1.
   A. Draw a budget line that represents the set of bundles this individual can afford if they use all their income. (Put movies on the X axis). Label the places where the budget line intercepts each axis and the slope of the line.
   B. Suppose that in consumer equilibrium this individual consumes 7 soda pops and 3 movies. What rules must hold in consumer equilibrium? Label this bundle in your drawing (call it point "A"). Draw an indifference curve associated with this bundle, and explain how its slope at the equilibrium point relates to the slope of the budget line.
   C. Consider the bundle 2 Movies and 8 Sodas. Label this point. What can you say about the slope of the indifference curve that passes through the point? (For example, is it bigger than, equal to, or smaller than -1?)
   D. Now suppose that income goes up to 15. Illustrate how the budget constraint will change. If both goods are normal, explain where the new equilibrium will be (your answer might consist of a region of bundles, rather than just one bundle).

2. Suppose that goods A and B are perfect compliments. Draw a set of indifference curves for perfect compliments, and explain why the curves look the way they do. Be able to do the same for perfect substitutes.

3. Suppose that you consume two things: ND football games and french fries. Your income is 60, the price of football games is 20, and the price of a serving of fries is 10 (expensive fries!). Consider this table of marginal utilities:

Quantity	MU from football	MU from servings of fries
1	200	100
2	150	75
3	100	50
4	50	20
5	25	10
6	20	5

   A. What is the opportunity cost of going to a football game?
   B. Your study friend Mr. Silly notes that if you consume one football game, and one serving of fries, the marginal utility per dollar spent from both goods is 10. So is this the equilibrium?
   C. Suppose that you consumed 1 football game and 4 servings of fries. Why is this not the equilibrium? What is the equilibrium?

4. Again, suppose you consume ND football games and french fries. As before, your income is 60, the price of football games is 20, and the price of a serving of fries is 10.

Now, suppose that the marginal utility you get for consuming your last serving of fries is $\frac{1}{2\,fries}$, where *fries* is the total servings you consumed. For example, if you consumed 5 servings of fries, your marginal utility from the fifth serving would be $\frac{1}{2*5} = \frac{1}{10}$. Similarly, the marginal utility from the last football game you go to is $\frac{1}{games}$. So, for example, if you went to 3 games, the last game would give you a marginal utility of $\frac{1}{3}$.

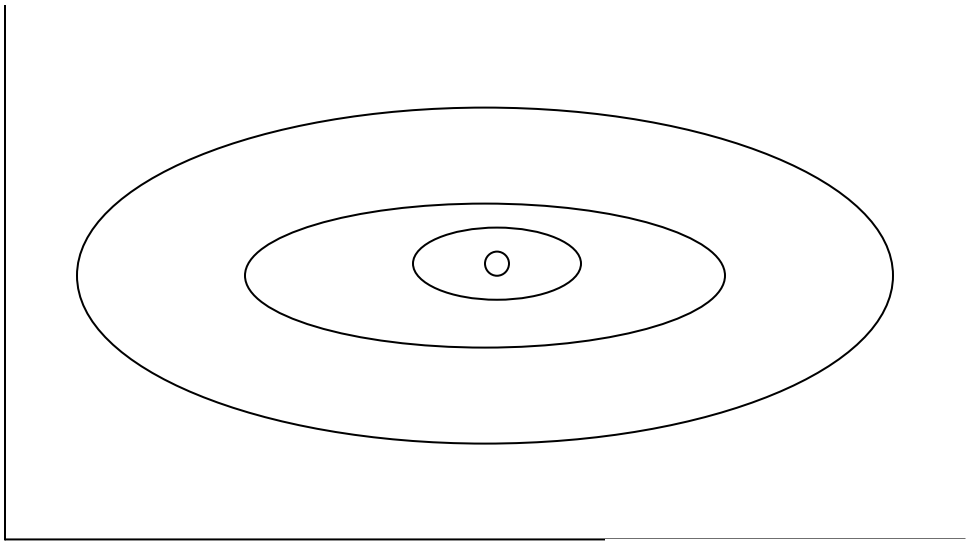
A. What must be true about marginal utility per dollar spend on fries and football games in equilibrium? Based on this, figure our what the ratio of football games to fries must be in equilibrium.
B. Recall that for all for any model with two goods *X* and *Y*, on the budget line it must be true that $P_x X + P_y Y = M$, where $P_x X$ is the total amount you spend on good *X*, $P_y Y$ is what you spend on *Y*, and *M* is income. Write down the budget line for this problem, putting the information for prices and income into this equation. You should be left with an equation that has two variables, *fries* and *games*.
C. Using your answer to part A, substitute for one of the variables in part B, so that now the budget-line equation is only an equation with one variable. Solve this equation. What is the equilibrium quantity of games and fries consumed?

5. Repeat problem 4, but now suppose that the marginal utility of fries is just $\frac{1}{fries}$. Now what is the equilibrium? (It is okay if the equilibrium has fractions).

6. Repeat problem 4 (so use the original marginal utility of fries), but now suppose that the price of a football game is 40. Now what is the equilibrium?

7. Consider a set of indifference curves that looks like this:

Hours of video games



Hours of television

Suppose that utility rises as we head towards the center of these circles. Is the set of preferred bundles convex? From the picture above, is there any evidence that this person's preferences violate the law of diminishing marginal utility? Intuitively explain how preferences might look like this (in other words, tell me what is happening to this person's satisfaction from consuming tv and video games).

8. Suppose that the utility from consuming hours of studying (denoted *s*) and consuming hours of chilling out (denoted *c*) can be represented by the following *maringal utility* functions

$$mu(s) = 1/s$$

$$mu(c) = 1/c$$

where *mu*(*s*) is the marginal utility gained from the last hour of studying, and similarly for *mu*(*c*). Suppose the price of studying is 1$, and the price of chilling out is 3$. What will be the ratio of studying to chilling out in the consumer's equilibrium? In other words, in equilibrium, what will the ratio of *s* over *c* be equal to?