Problem Set 1

1. For lunch, Ada prefers to eat soup and bread in fixed proportions. When she eats X pints of soup, she prefers to eat $\sqrt{X}$ ounces of bread. If she has X pints of soup and more than $\sqrt{X}$ ounces of bread, she eats all the soup along with $\sqrt{X}$ ounces of bread, and throws the extra bread away. If she has X pints of soup and fewer than $\sqrt{X}$ ounces of bread (say Y ounces), she eats all the bread along with Y^2 ounces of soup and throws the extra soup away.

   a) Draw Ada's indifference curves between soup and bread.
   b) Assume she spends all her income on soup and bread. Plot her income-consumption curve, her Engel curve for soup, and her Engel curve for bread.
   c) Derive her demand function for the two goods. [Note that demand function is a function of prices and income].

2. Gary has two children, Kevin and Dora. Each one consumes "yummies" and nothing else. Gary loves both children equally. For example, he is equally happy when Kevin has two yummies and Dora has three, or when Kevin has three yummies and Dora has two. But he is happier when their consumption is more equal.

   a) Draw Gary's indifference curves.
   b) What would they look like if he loved one child more than the other?
   c) Suppose that Kevin starts out with two yummies and Dora with eight yummies, and that Gary can redistribute their yummies. Draw a "budget line" that shows his available choices and indicate his best choice by adding indifference curves.
   d) How would your answer differ if Kevin started out with six yummies and Dora with four?

3. Assume that a utility function is given by $\min(2X_1 + X_2, 2X_2 + X_1)$, where min is the minimum of the two values. Derive the demand function for X1 and X2.

4. Consider a consumer who purchases two goods, x and y. The consumer's utility function is $U(x, y) = x^2 y^3$. The prices are p_x and p_y, and the consumer's income is I.

   a) Derive the demand function for x and y.
   b) Assume initially I = 30, $p_x = 1$, $p_y = 8$. Now assume the price of y decreases to 2, compute the initial optimal bundle A before price change, and new optimal bundle C after price change.
   c) Identify the substitution effect and income effect. What is the direction of the substitution effect? Is good y a normal, inferior or Giffen good? Explain.

5. During the traditional holiday Mid-Autumn Day people eat a lot of moon cakes. Moon cake producers often issue moon cake stamps (月饼券) and sell them at face value to companies. Companies then give the stamps to their employees or clients,

who can use these stamps to buy moon cakes. Let x_1 be the number of moon cakes, and x_2 be the composite goods. The price is $P_1 = P_2 = I$.

a) Assume that Qin has an income of 5000 yuan, and she receives a moon cake stamp worth 500 yuan from her company. Graphically show how would this change her budget constraint? Assume that she has a (strictly)convex preference, graphically show the possible optimal demand for moon cakes.

b) Assume that the moon cake producers offer to buy moon cake stamps back at a discount of 50%, i.e. a stamp worth 500 yuan can be resold at 250. Graphically show how would this change Qin's budget constraint? Also indicate all possible optimal demand for moon cakes in this case.

6. (Open question) The new interpretation of marriage law says that a wife does not share the ownership of an apartment with her husband if her husband paid for it before the marriage. How do you think this change will affect the housing price? Briefly explain.
(possible answer)
- it may increase demand for houses if males are encouraged to buy their own houses before the marriage, which leads to higher price.
- it may increase demand for houses if females tend to buy their own houses, which will lead to higher price.
- it may decrease demand for houses if females do not emphasize the availability of houses for marriage, which will lead to lower price.
- it may not affect housing price, because if the demand and supply in marriage market remains the same, then females can demand a transfer of wealth from males to pay for the houses so as to share the ownership.