# Problem Sets 4

Due in class Oct. 8 F

1. Optimal Consumption Decision in Utility Maximization Model

1) Biwei's marginal use value for chamomile tea consumption is *MU=-2Q+6,* where *Q* is the box quantity of chamomile tea consumed and takes only integer values. Draw the marginal use value curve and total use value curve for *Q* less than 5. If the price for a box of chamomile tea is $4, how many boxes will Biwei consume per week? If the price drops to $2, how many boxes will Biwei consume per week?
2) Biwei's total use value is now given by $TU = 8\sqrt{Q}$, where *Q* takes only integer values. Draw the marginal use value curve and total use value curve for *Q* less than 5. If the price for a box of chamomile tea is $4, how many boxes will Biwei consume per week? If the price drops to $2, how many boxes will Biwei consume?
3) Both Biwei and Alex share the utility function $TU = \sqrt{Income}$. If Biwei makes $10,000 and Alex makes $40,000 per month, how can their incomes be distributed to maximize social utility?

2. Consumption Budget Constraints and Production Possibilities Frontier

1) Suppose the unit price of apple is $3 and the unit price of banana is $2, Biwei's daily income is $96. Derive Biwei's daily consumption budget constraint (CBC). If Biwei split his income equally on the consumption of two goods, what would be the quantities of the goods he can consume?
2) In the market place, what is the opportunity cost of getting an apple in terms of banana? What is the slope of Biwei's CBC? What are the answers if the unit price of apple rises to $4? What would be the quantity of the goods Biwei will consume?
3) What is the difference between the PPF and CBC? Under what condition would they be identical?

3. Given Biwei's utility function U=4XY, where X is consumption of beer and Y is consumption of pizza. For this utility function, the marginal utility of X is $MU_X = 4Y$; the marginal utility of Y is $MU_Y = 4X$.

1) Suppose Y = 3. Calculate Biwei's utility for X = 2, 3, 10, and 11. For a given level of Y, does good X display diminishing marginal utility?
2) Suppose X = 3. Calculate Biwei's utility for Y = 2, 3, 10, and 11. For a given level of X, does good Y display diminishing marginal utility?
3) Find three different bundles containing X and Y that give Biwei 48 units of satisfaction. Plot the three bundles and connect them with an indifference curve. What happens to the marginal rate of substitution between X and Y as consumption of X increases?
4) Does the principle of diminishing MRS depend on the diminishing marginal utility of X and Y?