Due: Thursday, June 27 (in class)

*Challenging questions are marked with *.*

Question 1: Prove that under the following assumptions listed, two indifference curves will never intersect with each other. [HINT: *you may need to draw a graph and choose several points on those indifference curves to facilitate your proof.*]

1. completeness (you can compare between choices and make decisions)
2. transitivity (you like A more than B and like B more than C, then you like A more than C)
3. continuity (your preference is consistent)
4. monotonicity (the more, the better)
5. convexity (you prefer a balanced consumption bundle to an extreme one)

Question 2: What is the difference between ordinal preference and cardinal preference?

Question 3: Find the marginal rate of substitution (**MRS**) for the following utility functions:

1. $U(x, y) = \theta x^{\alpha} y^{\beta}$
2. $U(x, y) = \alpha x + \beta y$
3. $U(x, y) = \alpha x + \beta \ln y$
4. $U(x, y) = x + xy + y$
5. $U(x, y) = \sqrt{x^2 + y^2}$
6. $U(x, y) = \frac{1}{\theta}(x^{\theta} + y^{\theta})$

***Question 4:** Draw indifference curves for the following two utility functions:

1. $U(x, y) = \max(x, y)$
2. $U(x, y) = 2\min(x, y) + \max(x, y)$

Question 5: Draw budget sets for the following three situations:

1. Prices for good x and y are \$1 and \$4, respectively. Total income is \$100.
2. Prices for good x and y are \$1 and \$4, respectively. Total income is \$100. You need to buy at least 20 units of x to survive.
3. Prices for good x and y are \$1 and \$4, respectively. Total income is \$100. You can buy at most 80 units of x due to government rationing.

Question 6: Suppose that you have this Cobb–Douglas utility function, $U(x, y) = x^{\alpha}y^{\beta}$, the price for good x is p_x and the price for good y is p_y. Total income is I. Find the demand functions of x and y which maximize the utility function.

Question 7: Suppose that you have this linear utility function, $U(x, y) = x + y$, the price for good x is p_x and the price for good y is p_y. Total income is I. Find the demand functions of x and y which maximize the utility function.

Question 8: Suppose that you have this Leontief utility function, $U(x, y) = \min(x, 2y)$, the price for good x is p_x and the price for good y is p_y. Total income is I. Find the demand functions of x and y which maximize the utility function.