Problem Set – Chapter 3

1. Graph a typical indifference curve for the following utility functions and determine whether they obey the assumption of diminishing MRS. To do this first pay attention to the form of the utility to see if it is Cobb Douglas, Perfect Complements, Perfect Substitutes or something new. Then set utility to something like 1 or 10 so you can graph it.

   a. \( U(x, y) = 3x + y \)

   b. \( U(x, y) = \sqrt{x} \sqrt{y} \)

   d. \( U(x, y) = x^{2/3} y^{1/3} \)

   e. \( U(x, y) = \min(2x, 3y) \)

2. Suppose a consumer’s preferences for two goods can be represented by the Cobb-Douglas utility function \( U(x, y) = A x^\alpha y^\beta \), where \( A, \alpha, \) and \( \beta \) are positive constants.

   a. What is \( MRS_{x,y} \)?

   b. Is \( MRS_{x,y} \) diminishing, constant, or increasing as the consumer substitutes \( x \) for \( y \) along an indifference curve?

   c. On a graph with \( x \) on the horizontal axis and \( y \) on the vertical axis, draw a typical indifference curve. Indicate on your graph whether the indifference curve will intersect either or both axes.

3. Ch 3, Problem 3.6

   For the following sets of goods draw two indifference curves, \( U_1 \) and \( U_2 \), with \( U_2 > U_1 \). Draw each graph placing the amount of the first good on the horizontal axis.

   a. Hot dogs and chili (the consumer likes both and has a diminishing marginal rate of substitution of hot dogs for chili)

   b. Sugar and Sweet’N Low (the consumer likes both and will accept an ounce of Sweet’N Low or an ounce of sugar with equal satisfaction)

   c. Peanut butter and jelly (the consumer likes exactly 2 ounces of peanut butter for every ounce of jelly)

   d. Nuts (which the consumer neither likes nor dislikes) and ice cream (which the consumer likes)