EconS 301- Intermediate Microeconomic Theory
Homework #1 - Due date: Tuesday September 6th, 2022.

1. Consider a consumer with utility function $u(x, y) = 3y + 2x$ who seeks to reach a utility level $u = 20$. Solve for y to find her indifference curve. Is it increasing or decreasing? What if her utility function is $u(x, y) = 3y - 2x$?

2. Maria's utility function is $u(x, y) = 5x^{1/2}y^{1/4}$. Graph her indifference curve for utility levels $u = 10$ and $u = 20$. What is the utility elasticity of good x? And of good y? Interpret.

3. Answer the following questions for each of the utility functions in Table 2.1 (Chapter 2, page 17).

   (a) Find the marginal utility for good x and y, MU_x and MU_y.

   (b) Are these marginal utilities positive? Are they strictly positive? Connect your results with the properties of monotonicity and strict monotonicity.

   (c) Find $MRS = \frac{MU_x}{MU_y}$. Does MRS increase in the amount of good x?

   (d) Depict an indifference curve reaching a utility level of $u = 10$ and another of $u = 20$. Do the indifference curves cross either axis?

   (e) Provide an example of goods that you think can be represented with each utility function in table 2.1.

4. Find the marginal rate of substitution (MRS) for each of the utility functions on Table 2.1 (Chapter 2, page 17). Are the MRS you found diminishing? Provide an economic interpretation for each MRS.

5. Eric's preferences for books, x, and computers, y, can be represented with the following Cobb-Douglas utility function $u(x, y) = x^3 y^2$.

   (a) Find Eric's marginal utility for books, MU_x, and for computers, MU_y.

   (b) Are his preferences monotonic (i.e., weakly increasing in both goods)?

   (c) For a given utility level, $\bar{u}$, solve the utility function for y to obtain Eric's indifference curve.

   (d) Find Eric's marginal rate of substitution between x and y (MRS). Interpret your results.

   (e) Are his preferences convex (i.e., bowed-in towards the origin)?

   (f) Consider a given utility level of 10 utils. Plot his indifference curve in this case.