Due date: September 24th.

EconS 301 - Excel assignment 1
Budget Constraints, Utility Functions, and Optimal Choice

Instructions: You can work in groups of up to four students. Each group can submit a single assignment. Please email the Excel file with your answers (using one sheet per question 1-3) to TA Casey Bolt at casey.bolt@wsu.edu before September 24th at noon. In your email, please include the name of all students contributing to the assignment.

1. A) Use Excel to create a chart of a budget constraint that is based on the following information: Income (I) = 100, Price of good 2 \( (p_2) = \$3/\text{unit} \), and Price of good 1 \( (p_1) = \$2/\text{unit} \). Put good 2 on the y axis and good 1 on the x axis.

   B) What combination of shocks (i.e. changes in income and/or prices) could make the new budget line be completely inside and steeper than the initial budget line. Create a new chart to show the changes and explain.

   C) What happens to the budget line if all prices and income doubles from your budget constraint in part c)? Create a new chart to show the changes and explain.

2. The utility function, \( U = x - 0.03x^2 + y \), has a quasi-linear functional form. Use this utility function and Excel to answer the questions that follow.

   A) Compute the value of the utility function at bundle A, where \( x = 10 \) and \( y = 1 \). Show your work.

   B) Working with bundle A, find the average marginal utility of \( x \) as \( x \) rises from \( x = 10 \) to \( x = 20 \). Show your work.

   C) Find the marginal utility of \( x \) for bundle A where \( x = 10 \) and \( y = 1 \) (using derivatives). Show your work.

   D) Why do the two methods of determining the MUx yield different answers?

3. The utility function, \( U = 10x - 0.1x^2 + y \), has a quasi-linear functional form. Use this utility function and Excel to answer the questions that follow.

   A) Suppose the budget line is \( 100 = 2x + 3y \). Use excel to find the optimal solution. Show your work.

   B) Suppose the consumer considers the bundle \((0, 33.33)\), buying no \( x \) and spending all income on \( y \). Use the MRS compared to the price ratios logic to explain what the consumer will do and why.
C) Consider the parameters in the utility function, a, b, c, and d \((U = ax - bx^c + dy)\). If a increases, what happens to the optimal consumption of \(x^*\)? Explain how you arrived at your answer.