Due Date
The due date for this lab will be set by your lecturer or recitation instructor. Late submissions will not be accepted.

You are encouraged to discuss this assignment with other students and with the instructors, but the work you hand in should be your own.

Getting Help
For helpful background material, see the web page

https://sites.math.rutgers.edu/courses/251/ComputationalLabs/Computing251.html

While problems you have dealt with so far in class only have up to three variables, problems in the real world can have much more than that. In this lab, you will deal with a problem in 4 variables and see how the standard optimization techniques can be used on this problem.

INSTRUCTIONS
For this assignment, the individualized data from your instructor will consist of two functions $f(w, x, y, z)$ and $g(w, x, y, z)$. With this information, your goal will be to find the maximum value of $f(w, x, y, z)$ with respect to the constraint $g(w, x, y, z) \leq 1$.

- **Use Maple, Matlab, or Mathematica to**

  - Find points where the gradient of f is zero, and check to see if these points are within the desired domain.
  - Use Lagrange multipliers to determine the critical points along the boundary of the domain.
  - Figure out where the maximum value of f is attained and what this maximum value is.

- **Your code should consist of the following:**

  - Storing the two functions f and g.
  - Finding (and displaying) all possible 'interior' critical points by finding points where the (4-dimensional) gradient of f is zero. Determine which of these points lie within the constrained region.
  - Use Lagrange multipliers (again in 4-dimensions) to determine the potential critical points along the boundary $g(w, x, y, z) = 1$.
  - Find the value of f at each of these points, determine the maximum and minimum value, along with at which of the critical points it is attained.

- **Hand in a printout of your work. In this printout:**

  - Label all pages with your name and section number. Also, please *staple together* all the pages you hand in.
  - *Clean up your submission by removing the instructions that had errors.*