**Note:** For maximum credit, show all work and support your answers. Each numbered question is worth the stated number of points.

1. State the following problem in standard minimization form. Do **not** attempt to solve this problem.

Maximize 

Subject to:

1. Formulate the following problem in the form **A**x = **b** for Wolfe’s gradient reduction method. Do **not** attempt to solve this problem.

Minimize

Subject to:

1. State the dual of the following problem.

Minimize

Subject to:

1. Consider this problem:

Minimize:

Subject to:

* 1. State the necessary KKT conditions.
  2. Sketch the feasible region and determine the ui values at each of the corner points. You may use a computer to calculate the individual values, but not a computer algorithm.

* 1. Using only the results of Part b, where do you think the solution to this problem is?

1. Consider the following problem and Rosen’s method

Minimize:

Subject to:

* 1. Let **x**k = (2, 0)T. Determine **M**, with any constraints going through x1 binding. You may use a computer to calculate individual values, but not a computer algorithm. Then, determine which one of the initial constraints should be relaxed.
  2. Relax the constraint you selected in Part a and then find a new **M**. Then find **P**, ∇f(**x**k), **d**k, λMAX, λ\*, and λk. Also, state the value of **x**k+1. You may use a computer to calculate individual values, but not a computer algorithm. Show all your work here with each item listed here labeled.

1. Consider the following problem.

Minimize:

Subject to:

* 1. Which algorithm that we have studied would you use to solve this problem? Why?
  2. Choose a starting point and, using the method you chose, do one iteration. You may use a computer to calculate individual values, but not a computer algorithm.

* 1. Is the result an optimal solution? Why or why not?