MATH 652: Optimization II

Lecturer: Prof. Wolfgang Bangerth
Blocker Bldg., Room 507D
(979) 845 6393
bangerth@math.tamu.edu
http://www.math.tamu.edu/~bangerth

Homework assignment 2 – due Thursday 2/4/2010

Problem 1 (l_∞ minimization). In last week's homework, you formulated as a linear program the problem of finding a line of the form $y(t) = at + b$ using l_∞ minimization through this data set:

t_i	0	1	2	3
y_i	1.1	1.9	2.8	3.2

You should have ended up with a linear program in three variables and with eight constraints.

We have seen in class that among the solutions of a linear program is always at least one vertex. A simple way to find the solution is to find all basic solutions, and then

- eliminate those that are not feasible, i.e. select only the feasible basic solutions (we have seen that these are then the vertices of the feasible set)
- choose the feasible basic solution for which the objective function has the smallest value.

Perform this procedure by writing a program (or doing it by hand :-) that computes all basic solutions, tests for feasibility, and then checks their objective function values. Answer the following questions: (i) How many basic solutions exist for this problem? (ii) How many of these are feasible? (iii) What is the minimal objective function value? (iv) At how many vertices is this value attained? **(8 points)**

Problem 2 (l_∞ minimization, again). Repeat the same problem with the following set of measured data:

t_i	0	1	2	3	4	5	6	7	8	9
y_i	1.1	1.9	2.8	3.2	4	5	6	7	8	9

Answer the same questions as before. What is likely going to be the problem in your algorithm if I kept giving you more and more data points? Can you estimate how the number of operations your algorithm needs to perform grows asymptotically if the number N of data points grows? **(4 points)**