

ENCE 724/BMGT 832
Nonlinear Programming
Spring 2005
Dr. Gabriel

Homework #4

Given out: February 17, 2005

Due at start of class: February 24, 2005

Note:

Homeworks will be collected at the start of the class and each week several students will be selected to present their homeworks to the class during the first 15 minutes. Five minutes (or less) will be devoted for each question.

Reading:

Go to MATLAB and type “help toolbox\optim” at the prompt `>>`. This will list all the optimization routines. Look through the ones on constrained and unconstrained optimization to familiarize yourself with what is available. Feel free to test things out. To find out more about a particular routine, you type “help” and then the subroutine name such as “fmincon”. Also, investigate the 2-D plotting capabilities by typing “help plot”.

Text Problems:

4.2 Use MATLAB to plot this function (as well as to help you with any computations). Supply all code and output. Note that just running MATLAB without any mathematical reasoning supplied will result in less than full credit for this problem.

Cones-1

Find the normalized tangent cone, normalized set of feasible directions, and normalized inner product cone at the point $\bar{x}^T = (0 \ 0)$ for the following sets S:

- a. $S = \{(x_1, x_2) \mid -1 \leq x_1 \leq 1, x_2 \geq x_1^{1/3}, x_2 \geq x_1\}$
- b. $S = \{(x_1, x_2) \mid x_2 \geq x_1^2\}$

Cones-2

Find the normalized tangent cone and normalized set of feasible directions at the point $\bar{x}^T = (0 \ 0)$ for the following sets S.

- a. $S = \{(x_1, x_2) \mid x_1^2 + (x_2 - 1)^2 = 1\}$
- b. $S = \{(x_1, x_2) \mid x_1^2 + (x_2 - 1)^2 \leq 1\}$