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

Homework #2Given out:February 3, 2005Due at start of class:February 10, 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:

Chapter 2 in course text, Sections:2.1-2.3 Chapter 3 in course text, Sections:3.1-3.4

Text Problems:

2.6 3.3, 3.17, 3.20

Extra Credit Problem

Let $f : \mathbb{R}^n \to \mathbb{R}$ (not necessarily differentiable). Let β be a positive scalar. Prove that the directional derivative of f at a point \overline{x} in the direction $z \in \mathbb{R}^n$ is *positively homogenous*. That is,

 $f'(\overline{x},\beta z) = \beta f'(\overline{x},z).$

Note: There was a question asked in class on Feb. 3 about whether we want the directions to be of unit length. This problem is related to this question. However, generally we are only interested in the sign of the directional derivative, i.e., whether it's nonnegative or negative. Thus, using this result, the actual size of the vector z doesn't really matter.