AMSC 607 / CMSC 764 Homework 5, Fall 2010
20 points
Due October 12, before class begins.

7(a) (5 points) Write the KKT conditions for the problem:

$$\min_{\boldsymbol{p}} f(\boldsymbol{x}) + \boldsymbol{g}(\boldsymbol{x})^T \boldsymbol{p} + \frac{1}{2} \boldsymbol{p}^T \boldsymbol{H}(\boldsymbol{x}) \boldsymbol{p}$$

subject to

$$\boldsymbol{p}^T \boldsymbol{p} \leq \delta$$

where δ is a given number.

7(b) (7 points) Solve the problem

$$\min_{\boldsymbol{x} \in R^n} \boldsymbol{c}^T \boldsymbol{x}$$

subject to

$$x_1 + \ldots + x_n = 0,$$
$$\boldsymbol{x}^T \boldsymbol{x} = 1.$$

7(c) (8 points) Write the KKT conditions for the problem

$$\min_{\boldsymbol{x}} \boldsymbol{x}^T \boldsymbol{Q} \boldsymbol{x}$$

subject to

$$\boldsymbol{x}^T \boldsymbol{x} = 1,$$

where $\boldsymbol{Q}$ is a symmetric matrix. How many stationary points are there? What is the solution to the problem?
