Assignment 3 of MATP6600/ISYE6780

(Due on Nov-02-2018 in class)

Exercises 4.2, 4.4(a,b,c), 4.9(a), 4.17(a,b) in the textbook "Nonlinear programming: theory and algorithms, 3rd Ed. by Bazaraa-Sherali-Shetty".

Bonus problem

Consider the problem

$$\min_{\mathbf{x}\in\mathbb{R}^n} f(\mathbf{x}),\ \text{s.t. } g_i(\mathbf{x}) \le 0,\ i = 1, \ldots, m,$$

where f is a differentiable function, and each g_i is a convex differentiable function. Let $\bar{\mathbf{x}}$ be a local optimal solution and the Fritz John conditions hold with multipliers $(u_0, u_1, \ldots, u_m)$. Here, u_0 is the multiplier corresponding to $\nabla f(\bar{\mathbf{x}})$, and u_i corresponds to $\nabla g_i(\bar{\mathbf{x}})$, for $i = 1, \ldots, m$. Assume $u_0 = 0$. Prove that for any $i \in \{1, \ldots, m\}$, if $u_i > 0$ and $\mathbf{x}$ is a feasible solution, then $g_i(\mathbf{x}) = 0$.