Homework 4

Convex Optimization

Due April 2

1. Consider the optimization

$$\min \quad e^{x_1+3x_2-0.1} + e^{x_1-3x_2-0.1} + e^{-x_1-0.1}$$

Write a code to solve this optimization using the gradient method with the backtracking parameters $\alpha = 0.1$ and $\beta = 0.6$. Draw $f(x^{(k)})$ verses k for $k = 0, 1, 2, \cdots, 50$ on a log-linear plot.

2. Consider the optimization

$$\min \quad -\sum_{i=1}^{n} \log(1 - x_i^2) - \sum_{i=1}^{n} \log(1 - a_i^T x)$$

where $n = 5000$ and a_i are randomly generated vectors. Solve this optimization using Newtons method with the backtracking line search ($\alpha = 0.01$ and $\beta = 0.5$). Draw $f(x^{(k)})$ versus k for $k = 0, 1, 2, \cdots, 30$ on a log-linear plot.

3. Derive the distributed ADMM updates for SVM problem.