ES 201 Homework 3, Due 03/09/2017 (in class)

Reading: Secs. 7.2, 7.3, 7.4, 7.6, 7.7, 7.8, Lecs. 3, 4, 5, 6

Course Project

Problem 1

The goal of this problem is to get you to start thinking about your project and your project proposal, which will be a one to two-page document due late in March. We ask that you write down one project idea and answer in a paragraph (less than half a page), the following questions regarding the idea:

1. What is the goal of the project/idea?
2. What data will you use/need to collect?
3. What current/future tools from class do you plan to use?

N.B.: For the following problem(s), we encourage you to start using and familiarizing yourself with the `scikit-learn` Python package. It is likely to come in handy during project time.

Classification

Problem 2

(Variation on Problem 7.3) Derive the MAP decision rule for the case of two equiprobable classes, when the data follow the Gaussian distribution of the same covariance matrix. Compare this to the minimum-distance decision rule that assigns a vector $\mathbf{x}$ to the class whose mean it is closest to in Euclidean distance.

Problem 3

Problem 7.21.
Hint: For estimation of θ in **(iii)**, either use `scikit-learn` or use Newton's method instead of steepest descent. If you decide to use Newton's method, you can modify the code you wrote in **Problem 6** of **Problem Set 2** (the constraint is unnecessary so that you can use the standard form of Newton's algorithm).