Exam Guidance

How to prepare for the exam? Review the lecture, the reading notes and homework. Go through the examples (especially these in the reading notes) and homework problems. Make sure you fully understand them.

1. **MLE and Bayesian Inference**. Understand the basic principles; familiar with the derivation of MLE and posterior distributions of simple cases. Review the examples in the homework, lectures, and notes.

2. **K-means and EM**. Understand and familiar with the algorithmic procedures of K-means and EM algorithms (e.g., you should be able to run K-means and EM on toy examples like HW5). Understand the basic principles of K-means (that it is a coordinate descent of an objective function), and EM (on how it maximizes the log-likelihood function of Gaussian mixture models).

3. **Multivariate Normal**. Understand the concept and properties of covariance matrices, inverse covariance matrices (precision matrices), concept of independence, conditional independence, Markov graph, etc. Know how to derive the distribution of linear transforms of multivariate normal distributions (recall one of the homework problems).

4. **Kernel and Neural Nets**. Understand the basic idea and properties (e.g., familiar with the derivation of kernel method, and understand that the optimization of neural networks is non-convex, and know why).