

Stat 710 Final Study Guide

The final will be held on Thursday, May 2. There will be 8-10 short-answer questions, with topics taken from the following list:

- If I give you an optimization problem and method for solving it, for example, minimize $f(x) = \dots$. You should be able to write down the algorithm and describe the first couple of steps.

For Newton's method, this will involve deriving formulas for the relevant gradients and Hessians, and for gradient descent it will involve deriving formulas for gradients.

You should also be able to give some justification about why the method in question is better suited to the problem than other alternatives.

- If I give you an optimization problem, you should be able to tell me whether or not it is convex.
- One question will be on EM: I will ask you to derive the EM algorithm for a Poisson mixture model (see problem 10 in Lange for an example of this type of problem).
- Markov chains: Be able to identify whether a process is a Markov chain, be able to tell me if a Markov chain is irreducible and give justifications.
- Metropolis-Hastings: Given a proposal rule and a target distribution, you should be able to compute the acceptance ratio and describe the steps for Metropolis-Hastings.
- You should be able to compute gradients for neural nets and describe the back-propagation algorithm.