Stat 322: Statistical Theory
Exam 1 Review and Preview

Exam format:

80% In-class portion – Monday, March 29 (you can start at 10:15 if you wish)

- Closed-book and no calculator, but you may use a two-sided 8 ½ x 11 notesheet
- Focus will be on understanding of key ideas and ability to work standard problems.
- There may be short answers, short problems to solve, and R code and output to interpret.

20% Oral portion – Tues March 30 or Wed March 31. See details on reverse side.

What's covered:

HWs # 2-5
Book Sections 7.1-7.8 (plus Probability material as needed)
Topics including:

- Intro to Bayesian statistics and comparison with frequentist approach
- R (understanding code similar to problems we've seen)
- prior and posterior distributions; posterior predictive distributions; sequential analysis
- conjugate priors; non-informative priors
- likelihood functions
- Bayes estimators; loss functions
- MLEs; invariance; consistency
- Method of moments estimators
- sufficiency; factorization; exponential family
- other tidbits from the first part of the course

Problems to Review:

There are lots of problems here – don't feel that you must work every one of them. Read through them to see if you feel good about how to approach them, and work those where you feel like you need extra practice.

Section 7.2 # 1, 2, 5, 9
Section 7.3 # 1, 3, 6, 9, 10, 12, 17, 18, 24
Section 7.4 # 1, 7, 9, 10, 12, 13
Section 7.5 # 2, 3, 5, 13
Section 7.6 # 2, 10, 12, 14, 16, 17, 19, 23
Section 7.7 # 3, 4, 7, 9, 14, 15

Oral portion

Process

- 15-minute zoom conversation. Please sign up here for a spot Tues March 30 or Wed March 31 (the link is also on Moodle).
- Please arrive a few minutes early, and I'll let you in from the waiting room as soon as the previous conversation finishes. Please also have your camera on if at all possible.
- I'm planning to record the conversation, just to make it easier to go back and adjust scores if necessary.
- You get to start by answering a question of your choosing. Select your favorite topic from the list on the first page and describe what that topic is all about and why it's important.
- Then, I'll ask a few questions, focusing on conceptual understanding of ideas from Chapter 7. I want this to be more of a conversation than a quiz, so it's okay if we trade ideas back and forth, and I'm willing to give hints if you need a push. I am just interested in hearing you talk about some of the core ideas we've covered. And don't worry if you need to pause to gather thoughts at any point.
- I totally understand that an oral quiz may cause a certain level of anxiety for some, but I encourage you to look at this as an opportunity to explain how you think about Statistical Theory. We all think about the same concepts in different ways, so please explain your thinking in a way that is authentic to you.

Assessment (half steps possible):

- 4 = Outstanding ability to articulate and connect statistical theory concepts, with comprehensive and thoughtful understanding of topics.
- 3 = Good ability to articulate and connect statistical theory concepts, with clear understanding of most topics.
- 2 = Limited ability to articulate and connect statistical theory concepts, with an understanding of some big ideas but also some misconceptions.
- 1 = Little to no ability to articulate and connect statistical theory concepts, with a limited understanding of big ideas and many misconceptions.
- 0 = I'm taking Statistical Theory this semester??