Fourth Examination Study Guide

1. Understand what might be reasonable *null* and *alternative* hypotheses for a given problem (note that for alternative hypotheses there may be more than one "right answer" since we have a choice between one-sided and two-sided hypotheses/tests).
2. Understand the *roles* of the null and alternative hypotheses in a statistical test.
3. Be able to correctly compute the appropriate *test statistic* (i.e., z or t) for a statistical test.
4. Understand the *definition* of a p-value — it is a probability, but a probability of what?
5. Understand how to *compute* a p-value based on a z or t test statstic.
6. Understand the *decision rule* for whether or not to reject a null hypothesis.
7. Understand what is meant by *statistically significant* and how it relates to the decision made be a statistical test.
8. Understand how to conduct a statistical test concerning μ using a *confidence interval*.
9. Understand *simple* versus *composite* hypotheses.
10. How do we conduct a statistical test with a *composite* null hypothesis?
11. Understand how to conduct a *sign test* — mainly how do we compute the p-value for the test?
12. What are *type I* and *type II* errors?
13. What is the probability of making a type I error (assuming the null hypothesis is true)?
14. How does increasing/decreasing the significance level affect the probabilities of type I and type II errors (assuming such an error is possible)?
15. What is meant by the *power* of a statistical test?
16. What can be done to increase the power of a statistical test?
17. As usual, be comfortable with notation (e.g., H_0, H_a, μ, p, $\bar{x}$, s, n, $\hat{p}$, z, t, α).

Formulas/expressions you should understand when and how to use.

$$z = \frac{\hat{p} - p}{\sqrt{p(1-p)/n}}$$

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

$$np \geq 15, \quad n(1-p) \geq 15$$