

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 statistic.
 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 by 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*.
 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.

$$z = \frac{\hat{p} - p}{\sqrt{p(1-p)/n}}$$
$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$
$$np \geq 15, \quad n(1-p) \geq 15$$