

## Midterm 3 Study Guide

This is meant to be a representative sampling of the key concepts you will need to know, and it is not meant to be exhaustive. You should make sure that you are comfortable with Quizzes 10-11 and Homework Assignments 15-17.

1. What differentiates *random variables* from other random phenomena? Give examples of random variables
2. What conditions must we meet in order to be in the *binomial setting*?
3. What is the formula for the *binomial distribution*?
4. How do we compute the mean and the standard deviation of a random variable?
5. How do we compute the mean and standard deviation of the binomial distribution?
6. What can we say about the mean and standard deviation of a linear transformation of a variable?
7. What can we say about the mean and standard deviation of a sum of two variables?
8. What do  $X$  and  $\hat{p}$  represent in the binomial setting?
9. What are the mean and standard deviation of  $X$  and  $\hat{p}$  in a binomial setting?
10. What condition must  $n$ ,  $p$  satisfy in order for us to be able to use the normal distribution for the computations in a binomial setting?
11. What conditions must hold in order for us to be in the IID setting?
12. What do  $\mu$  and  $\sigma$  represent in the IID setting?
13. What are the formulas for the mean and standard deviation of  $\bar{x}$  in the IID setting?
14. What does the Central Limit Theorem say?
15. What do we refer to when we talk about the *sampling distribution* of  $\bar{x}$ ?
16. What quantities do we refer to as *parameters*, and what quantities do we refer to as *statistics*?
17. What is the general goal of a *confidence interval*?
18. State precisely what the confidence interval for the population mean  $\mu$  says, describing all the terms needed along the way.
19. What are the options we have when we want to reduce the *margin of error*? What are the tradeoffs?
20. How do we compute the sample size needed to achieve a specific margin of error?
21. What is the general idea behind a hypothesis test?
22. What kinds the two types of results can we get from a hypothesis test?
23. What errors do we refer to as Type I errors? What about Type II errors?
24. What three parts of our work in a hypothesis test or confidence interval are affected by the sample size and a change in the sample size?