

## Exam 3 — Review

- When: Wednesday, April 20 in class.
- What to bring: you may bring a calculator (no phones/laptops etc) and one 8.5 x 11 sheet of paper (both sides are fine, but it must be handwritten)
- Covers: Sections 8.1-8.9, 9.1-9.6, 10.1-10.3 in textbook (you should know a few basics from exam 1 and 2, as noted below)
- Review: you should look at the sections from the book, your homework, and the notes/examples from class
- The exam will be 5 or 6 short answer questions (with multiple parts). Some questions or parts of questions may ask about explanations of concepts and not simply calculations.

Questions/things to guide you. This is only a rough listing of possible topics:

1. (From previous exams) Know about binomial experiments. Know how to calculate a mean and variance/standard deviation for a discrete random variable, and how to calculate simple probabilities.
2. Know how to get a point estimate and the margin of error of the estimate (and what the margin of error means). Know how to calculate/construct a  $100(1-\alpha)\%$  confidence interval, and what the level of confidence means. Know the  $z_\alpha$  and  $z_{\alpha/2}$  values, what they mean, and how they are calculated.
3. Know how big  $n$  must be to use the “large sample” tests. How do we estimate means, difference in means, proportions, and difference in proportions? What are the mean and standard error of these estimators; are they biased? Know how to calculate a one-sided confidence bound, and how to calculate the sample size needed to obtain a certain margin of error. Know the  $\sigma \approx \text{Range}/4$  approximation to the standard deviation, and to use  $p = .5$  when trying to get the sample size for a binomial experiment (with a prescribed margin of error).
4. Know what a hypothesis test is and how they are structured - null/alternative hypothesis,  $\alpha$ , the two types of errors,  $p$ -value, one-tailed and two-tailed tests, how to calculate  $\beta$  for different values of the alternative hypothesis, power/power curve of a hypothesis test. Know what it means to “reject  $H_0$  at the 1% significance level” and what the  $p$ -value is measuring.
5. Know how to do the following tests for large-samples: population mean against some fixed value, comparing population means, comparing population proportion against a fixed value, comparing two population proportions (all of these could appear in either one- or two-tailed tests).
6. What is Student’s  $t$ -distribution - when do we use it, and what assumptions do we need to make on the population? How do we get the “degrees of freedom” for the test? Know how to compute confidence intervals and run hypothesis tests for  $\mu$  with small ( $n < 30$ ) samples.