

## Public Policy 529: Statistics

### Midterm #1 Review Guide

The exam will consist of a set of short answer questions similar to those in the problem sets and the quiz. Answering some questions may require simple calculations, and use of basic calculators during the exam is permitted for this purpose (no smartphones, however). You will be provided with a  $z$ -table and  $t$ -table with your exam. You will also be provided with a sheet containing all the major formulas used in the course to date.

These are the key parts of the material to date:

- Be ready to identify the level of measurement of a variable (nominal, ordinal or interval-level).
- Understand other characteristics of variables – discrete vs. continuous and dichotomous – that are relevant for how we use them. For example, we can find a mean and median for dichotomous variables even though they are nominal categories, but we do not interpret them in quite the same way as we do for interval-level variables.
- Be clear about which measures of central tendency and dispersion are appropriate for different levels of measurement. You should understand why these practices are sometimes not followed and why not following them can be problematic.
- With respect to probability theory, be able to determine when two events are independent or dependent (i.e. when a conditional relationship exists).
- We have discussed various ways to depict the joint distribution of two variables with contingency tables: raw frequency distributions, column frequencies, row frequencies, and joint probability distributions. You should be able to recognize these tables and use them to calculate joint probabilities or conditional probabilities.
- Understand the properties of a normal distribution and why the normal distribution is relevant for significance testing. Understand the intuition behind the Central Limit Theorem.
- When given the mean and standard deviation of a variable that has a normal distribution in the population, be able to use a  $z$ -score table to determine what proportion of the population lies above/below a given value, or between two values. If given the  $z$ -score for a particular observation, be able to calculate its value.
- Be familiar with the difference between populations and samples. For example, know the difference between a population parameter and a sample statistic.

- Understand the properties of sampling distributions. Know when these distributions can be approximated by a  $z$ -distribution (i.e. the standard normal), when we can use a  $t$ -distribution, and when neither of these distributions is appropriate.
- Understand the relationship between  $\alpha$  and our range of confidence. Be able to construct confidence intervals for means and proportions for any given level of  $\alpha$ . Use the appropriate statistic,  $t$  or  $z$ , and the correct formula for the standard error when constructing these intervals.
- Be able to perform a test of significance for a sample mean or a sample proportion against some given null hypothesis.