

Math 207 – Statistical Data Analysis

Descriptions of Content Objectives

Overview of Statistics – types of data, statistics, sampling strategies, bias and ethics, general vocabulary

Descriptive Statistics – graphical displays (pie charts, histograms, box plots), mean, median, mode, standard deviation, percentile, z-score, Empirical Rule, Chebyshev's Rule, outliers

Probability

Additive Rule & Visual Displays – basic probability and vocabulary, the Additive Rule, visual displays for probability including tree diagrams, Venn diagrams, two-way tables

Conditional Probability – Multiplicative Rule, Bayes' Theorem

Combinations & Permutations – general counting techniques, combinations, permutations, partitions

General Probability – integrating all skills to solve any probability problems

Random Variables

Discrete Random Variables – expected value, standard deviation, Binomial and Geometric distribution probabilities

Continuous Random Variables – Uniform and Normal distribution probabilities, using a normal distribution to approximate a binomial distribution

Sampling Distributions – sampling distribution probabilities, Central Limit Theorem

Types of Random Variables – identifying the type of random variable and distribution (discrete, continuous, sampling, binomial, geometric, etc.) based on descriptions

Statistical Inference

Confidence Intervals – constructing and interpreting confidence intervals for estimation of population means and proportions

Hypothesis Testing 1 – performing and interpreting hypothesis tests of a single sample mean or proportion, errors associated with hypothesis tests

Hypothesis Testing 2 – performing and interpreting hypothesis tests of two sample means or proportions

Types of Hypothesis Tests – identifying the type and setup of a hypothesis test for a given statistical experiment

Linear Regression – finding and interpreting regression lines, correlation coefficients, prediction intervals, testing for significant correlation with a single input and output variables, multiple regression (interpreting regression lines, which variables are significant to a regression model)

Chi-Square Tests – goodness of fit test, test for independence between two qualitative variables, chi-square distribution

Statistical Process – the execution of a statistical experiment from the design, sampling, calculations, and interpretation of results