

MSDS 401 Final Exam Study Guide

The final exam is a twenty-five-item, multiple-choice exam. Each question is worth four points, for a total of 100 points toward your grade in the course.

The final exam has a one-hour time limit. The exam should be completed in one sitting. It is not possible to complete a portion of the exam and come back to it later.

The final exam is a closed-book, closed-notes exam. Other than having the exam itself open in Canvas, you are not supposed to use your computer in answering questions on the exam. You should not be consulting with web resources in responding to questions on the exam.

The final exam is comprehensive, covering content from weeks 1 through 9 of the course. The exam concerns statistical concepts, with special emphasis on classical inference. There are no calculations and no programs to write.

Statistical Terms

You should be able to define the following terms: event, joint event, exhaustive set of events, mutually exclusive events, independent events, probability, joint probability, conditional probability, Bayes Theorem, population, population parameter, statistic, random sample, sampling distribution, standard error, Central Limit Theorem, mean, trimmed mean, median, mode, maximum, minimum, percentile, quartile (first, second, and third), variance, standard deviation, range, interquartile range, outlier, extreme outlier, alpha level, p-value, statistical significance, type I error, type II error, power, point estimate, interval estimate (confidence interval), null hypothesis, alternative hypothesis (directional and non-directional), hypothesis test (one- and two-tailed), covariance, correlation, response (dependent) variable, explanatory (independent) variable, linear regression, squared correlation (coefficient of determination), regression coefficient, principle of least squares, histogram, box plot, scatter plot, QQ plot, skewness, and kurtosis.

Concepts from Classical Inference

You should be able to describe characteristics of probability distributions: discrete, continuous, binomial, Poisson, normal, standard normal, Student's t, chi-square, and F. Know how these distributions are used in classical inference.

You should understand the logic of conducting tests of hypotheses and forming classical confidence intervals for the following types of population parameters: a single mean, difference between two means (independent and dependent), a single proportion, difference between proportions, normal approximation to the binomial (with possible correction for continuity), a single variance, difference between two variances, differences among three or more means (analysis of variance), and a single correlation coefficient or regression coefficient.

Within the context of classical inference, you should understand what happens to tests of null hypotheses, p-values, power, and the lower and upper bounds of confidence intervals when there are changes in alpha levels, sample sizes, or values of population parameters.

You should have a general idea of how classical inference differs from Bayesian inference. Know what is meant by a likelihood function, as well as prior and posterior probability distributions.