STAT 2000
Basic Statistical Analysis II

Course Content

Module I: Inference for the Mean of a Single Population when σ is Known or the Sample Size is Large; Inference for the Mean of a Single Population when σ is Not Known

- Review of principles of statistical inference: testing and estimation, confidence intervals
- Statistical decisions: Type I and Type II errors and their probabilities, power of a test
- Review of t-distribution (comparison with normal distribution), tests and confidence intervals, robustness of t-procedures

Module II: Inference for the Means of Two Populations

- Matched pairs t procedures
- Inference for the equality of means in two populations when population variances are equal* and when population variances are unequal, assumptions of normality and independence

Module III: Inference for the Means of Two or More Populations

- Graphical comparison of distributions
- Inference for the equality of means in two or more populations: introduction to ANOVA
- The F-distribution
- Equivalence of pooled 2-sample t-test and F-test*

Module IV: Probability and Discrete Distributions

- Review of probability concepts and rules
- Conditional probability
- Random variables, probability distributions, mean and variance of a random variable
- Mean and variance of the sum and difference of two independent random variables*
- Distribution of the sum and difference of two independent normal random variables*
- Review of binomial distribution
- Poisson distribution*

Module V: Analysis of Categorical Data and Goodness-of-Fit Tests

- Inference for a population proportion
- Power calculations*
- Inference for comparing two population proportions
- Inference for ($r \times c$) two-way tables: tests of independence and homogeneity of proportions, chi-square test, expected values, degrees of freedom
- Equivalence of Z-test and chi-square test*
- Goodness-of-fit tests
- Binomial goodness-of-fit test*

Module VI: Regression and Correlation

- Inference in simple linear regression (slope, confidence intervals*, prediction intervals*)
- Analysis of residuals and use of diagnostic tools
- Correlation: inference, correlation vs. regression
- Equivalence of testing for zero correlation and testing for zero slope
- Multiple regression

Module VII: Nonparametric Statistics - optional topic

- Sign tests for median and paired data*

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<u>Some Additional Notes</u>

Where there are any discrepancies between the way topics are covered in the course notes and in the reference books, please refer to the notes. Moreover, when there are notations or formulas that differ from the reference books to the notes, please refer to the course notes.

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