STATISTICS 224, Spring 2004

INTRODUCTORY STATISTICS FOR ENGINEERS

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TEXTBOOK: R. Johnson, Probability & Statistics for Engineers, 6th edn, Prentice-Hall

LECTURES: 11:00 – 12:15 TR, Room 2317 Engr Hall

FINAL EXAM: 12:25, Monday, May 10

COURSE REQUIREMENTS:

The grade in the course will be determined by two midterm exams each counting 25% toward the final grade, weekly homework assignments counting about 17%, and a final exam counting about 33%. Course content based on lectures, handouts, and textbook.
Assignments will consist mainly of problems taken from the textbook, and occasional occasional additional assigned exercises including the analysis of data sets.
Minitab (also R and Splus) computer packages will be discussed and used in later parts of course, but student may use any familiar means for performing necessary calculations for assignments.

Tentative Outline and Schedule of Topics

1. Treatment of Data (1 week)
   Dot diagrams, histograms, stem-and-leaf displays; descriptive measures: sample mean, median, variance, standard deviation; quantiles and percentiles.

   Johnson, Sections 2.1–2.7

2. Basic Probability Concepts (1-1/2 week)
   Sample space and events, probability axioms, elementary rules of probability, independent events, conditional probability, Bayes' Theorem.

   Johnson, Sections 3.1–3.7

3. Random Variables and Probability Distributions (3-1/2 week)
   Random variables, discrete and continuous, probability distributions, distribution function and probability density function; mean and variance of a probabilty distribution; special discrete distributions: binomial, geometric, Poisson, multinomial; special continuous distributions: normal, uniform, log-normal, gamma, Weibull; joint probability distributions.

   Johnson, Sections 4.1–4.10, 5.1–5.13

   MIDTERM EXAM 1

4. Sampling Distributions (1 week)
   Populations and samples, sampling distribution of sample mean $\bar{X}$, sampling distribution of sample variance S^2, t-distribution, chi-square (χ^2) distribution, F distribution.

   Johnson, Sections 6.1–6.4

5. Inferences Concerning Means and Variances (2-1/2 weeks)
   Methods of statistical inference, point and interval estimation of parameters, tests of hypotheses, inference procedures concerning one mean (one sample), inference procedures concerning two means (two samples); estimation of variances, inference procedures concerning one variance (one sample) or two variances (two samples); checking normality of a sample, normal probability (normal scores) plot.

   Johnson, Sections 7.1–7.9, 8.1–8.3

6. Inferences Concerning Proportions (1-1/2 weeks)
   Estimation of proportions, hypotheses concerning one proportion (one sample), hypotheses concerning two proportions (two samples), hypotheses concerning several proportions, analysis of two-way contingency tables, tests for independence, chi-square tests for goodness-of-fit.

   Johnson, Sections 9.1–9.5

7. Simple Linear Regression and Least Squares (1 week)
   Method of least squares estimation, properties of least squares estimators, inferences based on least squares estimators, checking adequacy of the model; correlation.

   Johnson, Sections 11.1-11.3, 11.5-11.6

   MIDTERM EXAM 2

8. Analysis of Variance (1 week)
   Completely randomized design, one-way layout model, randomized block design, multiple comparisons.

   Johnson, Sections 12.1–12.4

9. Factorial Experimentation (1 week)
   Two-factor experiments, replication, main effects and interactions, multi-factor experiments, 2-level (2^k) factorial experiments, fractional replication, confounding.

   Johnson, Sections 13.1–13.3

   FINAL EXAM