

Final Review

AMS102.03, Fall, 2003

Final Exam SPORTS COMPLEX Dance Studio 5 pm - 7 pm, Dec 16th
Office Hours 10am-12am, Dec 13th, 2:00pm-4:00pm, Dec 15th

What to bring: pencil, ID, **calculator**, eraser

Formula and Tables: Formula and tables will be provided with the exam. The exactly same formula and tables will be provided on the practice exam.

What to be covered: Chapter 1, 2.1-2.5, 3(no , 4(no 4.4.3, 4.4.5, 4.4.6), 5.1-5.3, 6, 7(no 7.4.3, 7.5.2), 8, 9.1-9.4, 10, 11.1-11.4,12.1-12.4

What to study: Handouts, Previous Exams, Quizzes, Notes/Textbook, Homeworks.

NOTE 1: Quiz grades, Bonus points for homeworks, Extra credits, etc will be posted on my website before Friday, Dec. 13th

NOTE 2: The solution of the practice exam will be given on Dec. 13th.

Important things to know

I. Data Analysis: Graphic Display, Numerical Measure, Mathematical Model

- DATA: Categorical, Quantitative
- DISPLAY: Pie Chart, Bar Chart, Histogram, Boxplot
- MEASURE OF CENTER: Sample Mean, Median, Mode
- MEASURE OF SPREAD: Sample Standard Deviation, Sample Variance, Interquartile Range
- DESCRIPTION: Skewed and Symmetric, Bimodal, etc
- Normal Distribution, 68-95-99.7 rule, Z-Score and use of normal table

II. Producing Data: Experiment and Observation

- SAMPLING
 - Population and Sample
 - Bias of voluntary response sampling and convenient sampling
 - Simple Random Sample
- EXPERIMENT
 - Explanatory Variable, Response Variable
 - Lurking Variable and Confounding
 - Control, Randomization and Replication
 - Comparative Study: Independent Sample, Paired Design
 - Placebo Effect, Double Blind

III. Probability

- PROBABILITY: Interpretation as proportion over repetitions of a random phenomenon,

- BASIC RULES: Venn Diagram, Union, Intersection, Complimentary
- CONDITIONAL PROBABILITY AND INDEPENDENCE
- PROBABILITY DISTRIBUTION: Probability represented as area under the density curve
- RANDOM VARIABLE: Continuous, Discrete
- PROBABILITY REPRESENTATION OF RANDOM VARIABLES: Density Curve, Probability distribution function, Mean, Standard Deviation

IV. Statistical Inference

- SAMPLING DISTRIBUTION: Population Parameter μ , σ and Sample Statistics \bar{x} and s , Bias and Variability of Sample Statistics
- SAMPLING DISTRIBUTION OF SAMPLE MEAN \bar{x} , mean and standard deviation of sampling distribution of \bar{x} , **Central Limit Theorem**
- HYPOTHESIS TESTING (TEST OF SIGNIFICANCE): Reasoning, Null Hypothesis and Alternative Hypothesis, P-value: Probability of getting more extreme or as extreme as observed if the null hypothesis is true, Implication of P-value, Significance Level
- CONFIDENCE INTERVAL: Interpretation
- STANDARD ERROR: Interpretation
- POPULATION PROPORTION
 - Sampling distribution of \hat{p} , mean and standard deviation
 - Inference of one proportion, Confidence Interval, Z-test
 - Standard Error and Margin of Error
 - Condition to use normal approximation: $np > 5$ and $n(1 - p) > 5$.
- MEAN OF ONE POPULATION (ONE SAMPLE)
 - σ known: Z-Test Statistic, use normal table to find P-value
 - Large Sample Size: Z-Test Statistics
 - σ unknown, small sample size: T-Test Statistics, use t table to find the range for P-value
 - An assumption of T-procedure: Population normal
 - T-distribution, degree of freedom, relation to standard normal distribution
- COMPARE TWO TREATMENTS
 - Paired Design: One Sample T-Procedure on the difference of each pair
 - Independent Sample T-Procedure (with assumption that variances of two populations are equal)
 - Be aware of the normal assumptions for the t-procedure
- COMPARE SEVERAL MEANS (ANOVA)
 - Understand the ANOVA table, where to find the information
 - Understand the logic behind the F-statistic: ratio between variation between groups and variation within the groups
 - Be aware of the assumptions (same as for the independent two sample T-procedure)