

Exam 2 Objectives

For Exam 2, a well-prepared student should be able to

- recognize the limitation of exploratory data analysis to the specific data studied
- distinguish between a population and a sample
- distinguish between an observational study and an experimental study
- describe the structure of an experimental study (subjects, factors, levels, treatments)
- recognize and apply basic statistical design principles of experiments: control, randomization, repetition
- use comparison or block design, including matched pairs, for control
- implement randomization in experiment design
- understand the use of “significant” in the context of statistics
- understand uses and limitations of sampling to form conclusions about a population
- select and implement an appropriate sample procedure (simple random sample, stratified random sample, multistage sample) for a population
- understand sources of sample survey bias (voluntary response, undercoverage, nonresponse, poorly worded questions)
- distinguish between a parameter and a statistic
- understand how the sampling distribution of a statistic is constructed for a given sample size
- understand how variability in a sample distribution is related to sample size and population size
- understand sources of bias and variability in use of a statistic in estimating a parameter
- recognize a random phenomenon
- understand what probability means for a random phenomenon
- describe an appropriate probability model (sample space and probabilities) for a random phenomenon
- describe an event and its complement
- determine if two events are disjoint
- determine if two events are independent
- state and use the basic rules of probability
- assign probabilities for a simple random phenomenon
- distinguish between a discrete random variable and a continuous random variable
- construct and use a probability histogram for a discrete random variable or a probability density curve for a continuous random variable
- estimate the mean of a random variable from a probability histogram or a density curve
- compute the mean, variance, and standard deviation of a discrete random variable
- understand and use the law of large numbers
- determine if two random variables are independent
- state and use the rules for means and standard deviations for linear transformations of a random variable and sums/differences of two random variables