Exam 2 Preparation

- Logistical details
  - Thur Oct 29
  - 50 minutes
  - Open-book, open-notes
  - Calculator needed

- Coverage
  - Handouts 8–14
  - Sections 5.1 – 5.4, 1.4 – 1.6

- Resources available online
  - This preparation sheet
  - Handouts
  - Quizzes and solutions
  - Investigation assignments and solutions
  - Optional exercises

- Types of questions to expect
  - Short answer
  - Calculations
  - Interpretations and explanations
  - Similar to handout examples, quizzes, investigations, optional exercises

- Advice for preparing
  - Prepare and organize your notes carefully
  - Don’t study less because it’s open-notes/book
  - Plan not to rely on your notes/book too much
  - Re-read, work through handouts
  - Re-read sections from text
  - Focus on understanding, not memorization
  - Review and make sure that you can answer quiz, investigation, optional exercise questions
  - Ask questions during class, office hours

- Advice during the exam
  - Show up on time!
  - Be cognizant of time constraint
  - Read carefully
  - Relate conclusions to context
  - Write and explain clearly
  - Show details of calculations
  - Do not elaborate excessively
Outline (of most important topics)

- Probability basics
  - Interpretation as long-run relative frequency
    - Approximation by simulation
  - Sample space
    - Event
    - Equal likeliness assumption
  - Conditional probability
    - Intuitive idea
    - Formal definition
    - Calculation from probability table
    - Representation in probability tree
  - Independence
    - Intuitive idea
    - Formal definition
- Probability rules
  - Complement rule
  - Addition rule
    - For disjoint events
    - General
  - Multiplication rule
    - General
    - For two independent events
    - For many independent events
  - Law of total probability
    - Calculating unconditional probability from conditional ones
  - Bayes’ rule
    - Calculating “reverse” conditional probabilities
    - Using probability table
    - Using probability tree
- Discrete random variables
  - Probability distribution
  - Expected value
    - Calculation
    - Interpretation
    - Decision applications
  - Variance, standard deviation
  - Binomial distribution
    - Conditions
    - Parameters \((n, p)\)
    - Calculations
    - Expected value
• Statistical significance
  o Reasoning process
    ▪ Null model
    ▪ Strength of evidence
    ▪ Interpreting p-value
  o Calculating p-values
    ▪ Approximation by simulation
    ▪ Exact calculation from binomial distribution
    ▪ Relation to strength of evidence
    ▪ Effect of sample size
• Continuous random variables
  o Probability density functions
  o Area as population/process proportion
    ▪ Using geometry
    ▪ Using calculus
  o Expected (mean) value, variance, standard deviation
  o Uniform distribution
  o Exponential distribution
  o Normal distribution
    ▪ Standardizing (z-score)
      • Calculation
      • Interpretation
    ▪ Empirical rule
    ▪ Calculations (Table Z)
      • Of proportions/probabilities
      • Of percentiles