STAT 301  Exam 1 Preparation   Winter 2018

Logistics:
- Mon Feb 5, 12:30-2:00
  - 12:10-12:30 for last-minute Q&A
- Open-book, open-notes, open-anything else that I’ve provided or that you prepare yourself
- Bring calculator, no computer use
- Material from Mon Jan 8 – Wed Jan 31: Chapter 1, HW1-5, Quizzes 1-7

Overview:
We have analyzed studies that involve one binary categorical (i.e., yes/no) variable, where the data are a sample (ideally, a random sample) from a random process or a large population

We have studied two primary types of statistical inference:
- Statistical significance, where the goal is to assess the degree to which the sample data provide evidence supporting a research conjecture;
- Statistical confidence, where the goal is to estimate a population parameter with an interval of plausible values.

We have studied three ways to conduct statistical inference in this situation:
- Simulation
  - Tactile (e.g., with coins)
  - Technology (e.g., with applet)
- Binomial probability distribution
  - By hand
  - With technology (applet or R)
- Normal distribution
  - When CLT conditions are satisfied
  - With technology (applet or R)

Outline:
- Observational unit, variable, population, sample, parameter, statistic
- Reasoning process of statistical significance; null model, simulation, p-value, strength of evidence
- Binomial probabilities
- Null hypothesis, alternative hypothesis
- Two-sided test, plausible value, confidence interval, effect of confidence level
- Significance level, rejection region, test decision, type I error, type II error, power, factors that influence power
- Normal probability model/curve, mean, standard deviation, empirical rule, z-score, normal probability calculations
- Sampling variability, sampling distribution, effect of sample size, Central Limit Theorem (CLT) for sample proportion
- Test statistic, z-test for popn proportion
• Standard error, critical value $z^*$, $z$-interval for popn proportion, sample size determination
• Interpretation of confidence level, “plus four” procedure
• Sampling, sampling bias, simple random sampling, precision
• Practical vs. statistical significance, importance of random sampling

**Advice:**
- Organize notes for efficient retrieval of information/formulas
- Do not plan to use text, notes too much
  - Do not prepare less than if exam were closed book/notes
  - Focus on understanding, not memorization
  - Be cognizant of time constraint
- Expect similar questions to what we answer in class every day, and on quizzes, and on HW
- Be prepared to think/explain/interpret
  - Not just plug into formulas
  - Be ready to explain process of how you would do calculations
    - E.g., p-value = $\Pr(X \leq k)$, where $X \sim \text{Binomial}(n, \pi)$
- Be ready to interpret, draw conclusions from computer output
  - Possibly exclude irrelevant output
- Read carefully
  - Be sure to answer the question asked
- Take advantage of information provided
  - Perhaps including computer output
- Relate conclusions to context
- Prepare as thoroughly as you would for a closed-book exam
  - Re-work in-class investigations
  - Re-work quiz and HW questions, refer to solutions online
  - Work through examples at end of chapter text
  - Re-read summary/discussion sections in text
  - Work through practice exam (under “exam information” on course website), check solutions
  - Bring questions to office hours (Thur 1-3, Fri 9-10)
    - Make appointment if you cannot make it to office hours
    - Extra, last-minute office hours: Mon Feb 5 from 10:30 – 11:30