

## STAT 301 Exam 1 Preparation Winter 2011

### *Logistics:*

- Wed Feb 2 (Groundhog Day!)
- Open-book, open-notes, open-handouts and anything else that I've provided
- Bring calculator
- No computer use
- Material from Mon Jan 3 – Fri Jan 28, Chapter 1, HW1-8, 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 cards)
  - Technology (e.g., with applet)
- Binomial probability distribution
  - By hand
  - With technology (applet or R or Minitab)
- Normal distribution
  - When CLT conditions are satisfied
  - With technology (applet or R or Minitab)

### *Outline:*

- Reasoning process of statistical significance; null model, simulation, p-value
- Binomial probabilities
- Observational unit, variable, population, sample, parameter, statistic
- Null hypothesis, alternative hypothesis
- Two-sided test, confidence interval, effect of confidence level
- Significance level, rejection region, test decision, type I error, type II error, power
- Sampling variability, effect of sample size, Central Limit Theorem (CLT) for sample proportion
- Normal probability model, normal probability calculations, z-score
- Test statistic, z-test for popn proportion, continuity correction
- Standard error, critical value  $z^*$ , normal-based CI for popn proportion, sample size determination
- Interpretation of confidence level, adjusted Wald procedure
- Population, sampling, sampling bias, simple random sampling, precision

- Practical vs. statistical significance, importance of random sampling

*Advice:*

- Organize notes for efficient retrieval of information/formulas
- Don't plan to use text, notes too much
  - Prepare as 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, in quizzes, 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 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 HW questions
  - Work through examples
  - Re-read wrap-up sections
  - Come to Tues class prepared with questions
  - Bring questions to office hours (extra office hours on Wed morning: 8:30-9:30)