

## Stat 218 – Final Exam Preparation

- Logistical details
  - Wednesday, March 15 in 02-206, 10:10am-1:00pm (Sec. 1), 1:10pm-4:00pm (Sec. 2)
  - Extra office hours: Tuesday from 9:10-11am, 3:10-4pm (room 25-102)
  - 170 minutes, but the exam will be only 50% longer (roughly) than a midterm exam
  - Open-book, open-notes; calculator needed
- Coverage
  - Roughly one-half to two-thirds on newer material
    - Outlines from days 27-37
    - Assigned readings, optional problems from chapters 10-12
    - Investigations 11-14
  - Roughly one-third to one-half on earlier material
    - Focusing on “big ideas”
- Resources available online
  - This preparation sheet
  - Day-by-day outlines
  - Reading, optional problem list
  - Investigation comments
  - Midterm exam solutions
- Types of questions to expect
  - Short answer
  - Calculations
  - Interpretations and explanations
    - Possibly of Minitab output
  - Similar to in-class examples, investigations, midterm exams
- 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
  - Review midterm exams, preparation sheets
  - Re-read the day-by-day outlines
  - Review and make sure that you can answer the investigation questions
  - Re-read assigned sections from the book
    - Focus on understanding, not memorization
  - Pay particular attention to chapter 13, day 37
  - Ask questions during review class session, office hours
- Advice during the exam
  - Show up on time
  - Read carefully
  - Relate conclusions to context
  - Write and explain very clearly
  - Do not elaborate excessively
  - Show details of calculations
  - Take advantage of partial information
  - Review your work, as time permits

**Outline** (of most important topics covered since last exam)

- Analyzing categorical data
  - Chi-square tests for  $r \times k$  contingency tables
    - Testing independence or equality of proportions
    - Only non-directional alternatives
    - Expected counts, test statistic,  $P$ -value
- Analysis of variance (ANOVA)
  - Purpose, need
  - Big idea: compare variation between groups to variation within groups
  - ANOVA table
    - Sums of squares
    - Degrees of freedom
    - Mean squares
    - Inter-relationships
  - F-test
  - Technical conditions
  - Multiple comparisons
    - Tukey procedure (Minitab)
- Linear regression
  - Association
    - Scatterplot
    - Form, direction, strength
    - Correlation coefficient
      - Properties
    - Causation
  - Linear model
    - Residual
    - Least squares criterion
    - Slope, intercept coefficients
    - Prediction, extrapolation
    - Interpretation of slope
    - Residual standard deviation
    - Coefficient of determination
    - Influential observations, outliers
    - Transformations
  - Inference for regression
    - Slope coefficient
      - Standard error
      - $t$ -test
      - Confidence interval
    - Correlation coefficient
    - Confidence interval for mean value, prediction interval
      - Difference between them
      - Where narrowest

**Fundamental ideas from entire course:**

- Observational unit, variable
  - Categorical vs. quantitative
  - Explanatory vs. response
- Graphical displays, numerical summaries
  - Shape, center, spread, outliers
- Population, sample
  - Parameter, statistic
- Sampling distribution
  - Standard error
  - Key results (Central Limit Theorem)
- Confidence interval
  - General form
  - Interpretation
  - Effects of sample size, confidence level
- Hypothesis test
  - Components
  - *P*-value
  - Interpretation
- Technical conditions
  - Transformations
- Design of study
  - Random sampling, bias
  - Randomization, confounding
  - Observational study vs. experiment
  - Scope of conclusions, causation