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