

Stat 217 – Final Exam Preparation

- Logistical details
 - Thursday, March 20, 7:10-10pm
 - Extra office hours during finals week
 - Tuesday from 1:10-3pm, Wednesday from 3:10-5pm, Thursday from 3:10-5pm (and by appointment)
 - 170 minutes
 - But the exam will be only slightly longer (if at all) than a midterm
 - Open-book, open-notes
 - Except for a small section on conceptual understanding
 - Calculator needed
 - Normal (z -), t -, chi-square tables needed
- Coverage
 - Roughly one-half to two-thirds on newer material
 - Topics 21-23, 25, ANOVA, 26-29
 - Outlines from days 17-20
 - Quizzes 20-24
 - Roughly one-third to one-half on earlier material
 - Focusing on “big ideas”
- Resources available online
 - This preparation sheet
 - Previous preparation sheets
 - Midterm exam solutions
 - Day-by-day notes
 - Quizzes and solutions
 - Optional assignments, solutions (in Blackboard)
- Types of questions to expect
 - Short answer
 - Calculations
 - Interpretations and explanations
 - Possibly of Minitab output
 - Similar to in-class examples, quizzes, optional assignments, 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
 - Re-read the day-by-day notes
 - Re-read highlighted passages, watch-out, wrap-up sections of book
 - Focus on understanding, not memorization
 - Review and make sure that you can answer the quiz, optional assignment questions
 - Ask questions during office hours
- Advice during the exam
 - Show up on time!
 - Read carefully

- Relate conclusions to context
- Write and explain clearly
- Do not elaborate excessively
- Show details of calculations
- Take advantage of partial information
- Check your work

Outline (of most important topics)

- Fundamental Ideas
 - 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
 - Confidence interval
 - General form
 - Interpretation
 - Effects of sample size, confidence level
 - Hypothesis test
 - Components
 - p -value
 - Interpretation
 - Design of study
 - Observational study vs. experiment
 - Scope of conclusions, causation
- Comparisons
 - z -test, z -interval for comparing proportions between two groups
 - Interpretation, conclusions
 - Effect of sample size
 - t -test, t -interval for comparing means between two groups
 - Independent samples, random assignment
 - Interpretation, conclusions
 - Effect of difference in sample means, sample variability, sample sizes
 - Paired t -test, t -interval
 - When to apply
 - One-sample t -procedure on differences
- Inference for two-way tables
 - Testing equality of proportions or independence
 - Chi-square test
 - Expected counts
 - Test statistic, p -value
 - Largest contribution(s) to test statistic

- 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
- Bivariate relationships
 - Association
 - Scatterplot
 - Form, direction, strength
 - Correlation coefficient
 - Properties
 - Least squares (regression) lines
 - Calculating slope, intercept coefficients
 - Prediction, extrapolation
 - Interpretation of slope coefficient
 - Coefficient of determination (r^2)
 - Inference for slope coefficient
 - Standard error
 - t -test
 - Confidence interval
 - Test for correlation coefficient

Which Procedure to Use When?

Now that we have learned many procedures for analyzing and drawing conclusions from data, one of the challenges is deciding which procedure to apply in a given situation. Some of the questions to ask are:

- Is there only a response variable, or is there also an explanatory variable?
- Is the response variable quantitative or categorical?
- Is the explanatory variable quantitative or categorical?
- For categorical variables, are there two categories or more than two?
- With a quantitative response variable and a categorical explanatory variable with two categories, were the data collected in a matched-pairs or independent-samples design?

Some of the statistical inference techniques in this course include:

- A. One-sample t -procedures for a mean
- B. Two-sample t -procedures for comparing means
- C. Paired-sample t -procedures
- D. One-sample z -procedures for a proportion
- E. Two-sample z -procedures for comparing proportions
- F. Chi-square procedures for two-way tables
- G. Analysis of variance (ANOVA)
- H. Linear regression procedures

Practice: Suppose that I record the following for each student enrolled in this class:

- Gender
- Number of quizzes taken
- Time spent sleeping last night
- Handedness (left- or right-handed)
- Political inclination (liberal, moderate, or conservative)
- Time spent on the final exam
- Score on the final exam

For each of the following questions, indicate (by capital letter) which procedure is the appropriate one to address the question.

- a) Are more than 10% of Cal Poly students left-handed?
- b) Is a student's number of quizzes taken useful for predicting his/her score on the final exam?
- c) Do male and female students differ with regard to the average time they spend on the final exam?
- d) Do the proportions of left-handers differ between males and females on campus?
- e) How much sleep did Cal Poly students get on average last night?
- f) Is there an association between gender and political inclination?
- g) Do students tend to score lower on the final exam than on the first exam?
- h) Do students with different political viewpoints tend to differ with regard to sleeping time?

Answers to Practice: a) D b) H c) B d) E e) A f) F g) C h) G