

STAT 252 Statistical Inference for Management II Winter 2010

Final Exam Preparation

- Logistical details
 - Section 6: Fri Mar 19 @ 7:10am-10am
 - Section 7: Mon Mar 15 @ 7:10-10am
 - Alternate time: Tues Mar 16 @ 7:10-10am
 - See list one course webpage
 - 170 minutes
 - But the exam will be roughly 50% longer than a midterm
 - Open-book, open-notes
 - Calculator, tables needed
 - Extra office hours
 - Fri Mar 12: 3:10-4:30pm
 - Mon Mar 15: 12:10-2pm
 - Thur Mar 18: 9:10-11am
- Coverage
 - Partially cumulative
 - Roughly half on newer material, half on earlier material
 - Newer material
 - Handouts 17-25
 - Quizzes 17-25
 - Investigations 10-13
- Resources available online
 - This preparation sheet
 - Day-by-day handouts
 - Quiz solutions
 - Investigation solutions
 - Previous exam preparation sheets, solutions
- Types of questions to expect
 - Short answer
 - Calculations
 - Interpretations and explanations
 - Some based on Minitab output
 - Possibly including irrelevant output
 - Similar to in-class examples, quizzes, investigations, previous 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 handouts
 - Re-answer those questions without consulting your earlier answers
 - Focus on understanding, not memorization
 - Review and make sure that you can answer quiz, investigation questions
 - Ask questions during review class session, office hours

- Advice during the exam
 - Show up on time!
 - Be cognizant of time constraint
 - Read carefully
 - Relate conclusions to context
 - Write and explain clearly
 - Do not elaborate excessively
 - Show details of calculations
 - Take advantage of partial information

Outline (of most recent topics)

- Multiple regression
 - Interpreting coefficients
 - Prediction intervals
 - Building models
 - R^2
 - Adjusted R^2
 - Residual standard deviation
 - (Overall) F -test of model utility
 - (Individual) t -tests for model coefficients
 - Partial F -test (for subset of predictors)
 - Stepwise regression
 - Parsimony
 - Categorical predictors
 - Dummy/indicator variables
 - For binary variables
 - For non-binary variables
 - Equivalence to two-sample t -test, ANOVA F -test
 - Interaction terms
 - Separate regression equations
 - Polynomial regression
 - Residual plots
 - Transformations
- Time series
 - Time series plots
 - Features
 - Trend
 - Seasonality
 - Cycles
 - Stationarity
 - Index numbers
 - CPI: adjusting for inflation
 - Smoothing
 - Moving average
 - Exponential smoothing

- Forecasting
 - Smoothed data (one-step ahead)
 - Prediction intervals
- Forecast accuracy
 - Mean absolute percentage error
 - Mean absolute deviation
 - Mean squared deviation
- Regression models for time series
 - Residual plot vs. order
 - Autocorrelation
 - Durbin-Watson test
 - Autoregressive model (lags)
 - Significance test for (linear) trend
 - Indicator variables for seasonality
- Quality control
 - Control charts
 - \bar{X} -chart for process location
 - R -chart for process variation
 - P -chart for categorical variable
 - Calculation and interpretations of control charts

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 yourself 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?
- When there is a quantitative response variable and a binary categorical explanatory variable, were the data collected in a matched-pairs or independent-samples design?

Some of the statistical inference techniques we have studied 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 goodness-of-fit procedures
- G. Chi-square procedures for two-way tables
- H. One-way ANOVA procedures
- I. Simple linear regression procedures
- J. Multiple regression procedures
 - J1. Overall F -test
 - J2. Individual t -tests
 - J3. Partial F -test
- K. Time series procedures
- L. Quality control procedures

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

- Gender
- Major
- Score on first exam
- 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) Do the various majors differ with regard to average sleeping time?
- b) Are more than 10% of Cal Poly students left-handed?
- c) Are the three political inclinations equally represented?
- d) Is a student's score on the first exam useful for predicting his/her score on the final exam?
- e) Do students tend to score lower on the final exam than on the first exam?
- f) Do males and females differ with regard to the average time they spend on the final exam?
- g) Do the proportions of left-handers differ between males and females on campus?
- h) Is time spent on the final exam useful for predicting final exam score, once exam 1 score is already considered?
- i) Is there a significant correlation between the number of quizzes that a student takes and his/her score on the final exam?
- j) How much sleep did Cal Poly students get on average last night?
- k) Are sleeping time, exam 1 score, and number of quizzes taken useful for predicting time spent on final exam?
- l) Is there an association between gender and major?
- m) Is major a significant predictor of final exam score, once exam 1 score and number of quizzes taken are already considered?