STAT 252 Winter 2017

Final Exam Preparation

Logistics:
- Wed March 22, 1:10-4pm
  - 170 minutes (more than three times as much time as a midterm)
    - But exam will be no more than 50% longer than a midterm
- Open-notes, open-book
  - You may bring anything that I have provided or that you produce yourself
- Bring calculator, normal probability table, t-table, chi-square table, control chart tables
  - No computer use
- Coverage
  - Roughly half on more recent material
  - Roughly half on earlier material
    - Focusing on big ideas

Outline:
- Time series
  - Time series plots
  - Features: trend, seasonality, cycles, stationarity
  - Consumer price index (CPI): adjusting for inflation
  - Smoothing
    - Moving average
    - Exponential smoothing
  - Forecasting
    - Smoothed data (one-step ahead)
    - Prediction intervals
  - Forecast accuracy
    - Mean absolute deviation
    - Mean squared deviation
    - Mean absolute percentage error
  - 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

**Resources available online:**
- This preparation sheet
- Handouts
- Quizzes and solutions
- Investigation assignments and solutions
- Practice exam and solutions
- Previous exams and solutions

**Types of questions to expect:**
- Short answer
- Calculations
- Interpretations and explanations
- Similar to examples, quizzes, investigations, practice exam, 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, work through handouts
- Focus on understanding, not memorization
- Review and make sure that you can answer example, quiz, HW, practice exam questions
- Ask questions during class, office hours

**Advice during the exam:**
- Show up on time!
- Read carefully
- Relate conclusions to context
- Write and explain clearly
- Show details of calculations
- Do not elaborate excessively

**Some review practice:**
Some of the statistical inference techniques we have studied include:

A. One-sample z-procedures for a proportion
B. Two-sample z-procedures for comparing proportions
C. One-sample t-procedures for a mean
D. Two-sample t-procedures for comparing means
E. Paired-sample t-procedures
F. Chi-square test for goodness-of-fit
G. Chi-square procedures for two-way tables
H. One-way ANOVA procedures
I. Simple linear regression procedures
J. Multiple regression procedures

For each of the following research questions, indicate (by letter) the appropriate statistical inference procedure for investigating the question.

1. Can you predict a Cal Poly student’s GPA based on his/her high school GPA, SAT score, and number of hours of employment per week?

2. Do students who have pulled at least one “all-nighter” this quarter tend to have lower GPAs than students who have not pulled any “all-nighters” this quarter?

3. Are students at Cal Poly – SLO more likely to wear clothing that says “Cal Poly” than students at Cal Poly – Pomona?

4. Is there an association between a person’s political viewpoint (liberal, moderate, conservative) and whether or not the person has made a financial contribution to charity in the past year?

5. Do customers at a restaurant tend to spend different amounts on their meal depending on whether classical, contemporary, or no music is playing in the background?

6. Can you predict a Cal Poly student’s GPA based on his/her high school GPA?

7. Did Cal Poly students get an average of less than 7 hours of sleep last night?

8. Are Cal Poly students equally likely to classify themselves as politically liberal, moderate, conservative?

9. Do cows tend to produce more milk if their handler speaks to them by name every day than if the handler does not speak to them by name? A farmer randomly assigned half of her cows to each group and then compared how much milk they produced after one month.

10. Suppose that a baseball manager wants to investigate whether players run more quickly from second base to home plate if they take a wide angle or a narrow angle around third base. He recruits 20 players to serve as subjects for a study. He plans to have each of the 20 players run with each method (wide angle, narrow angle) once.

11. Do sentences in John Grisham’s novels tend to be longer or shorter than sentences in Michael Crichton’s novels?

12. Are more than 90% of Cal Poly students native-born Californians?

13. After controlling for the distance of a hike, is elevation gain a useful predictor of how long the hike takes to complete?

14. Biologists recorded the frequency of a cricket’s chirps (in chirps per minute) and also the temperature (in degrees Fahrenheit) when the cricket measurement was recorded. They investigated whether chirp frequency is a significant predictor of temperature.