

36-201: Statistical Reasoning

UPCOMING EXAM

Final Exam on May 7, 1999

▷ **Date of Final Exam: Friday, May 7, 1999**

▷ **Time of Final Exam: 1:00pm–4:00pm**

▷ **Place of Final Exam: McConomy Auditorium, University Center**

▷ **Ground rules:**

- **The final exam is cumulative over the entire semester.**
- *See me now if you have a conflict with other final exams, or more than three finals in a 24-hour period.*
- Closed book, closed notes.
- Bring a *calculator*. You will not be able to share or borrow one during the exam, and you will need it to complete some problems on the exam.
- Bring one 8.5" by 11" sheet of paper with anything you want written on either side.
- A normal table will be provided; do not bring an extra one to the exam.
- Show your work for numerical calculations, and justify your qualitative answers. You will not get full credit unless you do. Also you will not get any credit for a wrong answer if you do not show work.

▷ **Office Hours During Exam Week**

Junker	Tue 2:00-4:00p	Baker Hall 232C	
Gitelman	Tue 6:30-8:30p	Porter Hall 226D	
Ianus	THU 5:30-6:30p	Old Student Center 219	[Note Day Change!]
Mariano	THU 6:30-7:30p	Porter Hall 226D	[Note Day Change!]

▷ **Review Session**

- There will be TA-run a review session Wednesday May 5 after Supper.
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| <i>Check with TA's in Lab for time and location.</i> |
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- **Bring Questions!** We will not have any prepared lecture! Everything we say will be in response to your questions.

▷ **What You Should Know for the Final Exam:**• **Old Stuff**

1. Review the material on p. 2 of the **Upcoming Exam** handout for *Midterm Exam 1*, including:

Boxplots, stem-and-leaf plots, histograms; numerical summaries of central location and spread; 68%–95%–99.7% rule; scatter plots, correlation and exploratory regression; contingency tables.

2. Review the material on p. 2 of the **Upcoming Exam** handout for *Midterm Exam 2*, including:

Causation vs. association, Simpson's paradox; types of studies, experiments vs. observational studies, surveys; samples vs. populations, precision vs. bias, SRS vs samples of convenience; probability calculations; CLT, Normal Approximation, Square Root Law.

• **New Stuff**

1. Confidence Intervals for proportions and means.

- (a) Square Root Law: Std Error of mean (or proportion) is $(StdDev) / \sqrt{sample\ size}$.
- (b) 68%-, 95%-, and 99.7%-confidence margin-of-error using the Square Root Law and the 68-95-99.7 rule.
- (c) Interpreting the confidence interval and the %-confidence level.
- (d) Using Minitab to make other confidence intervals.
- (e) Using boxplots, stem-and-leaf, etc. to check the assumptions (symmetric, uni-modal, no outliers?) for confidence intervals.

2. Significance Tests for proportions and means.

- (a) Null Hypothesis (H_0) and Alternative Hypothesis (H_A).
- (b) Effect size; interpret like Standardized Residuals.
- (c) p -value; amount of evidence against H_0 (small p bad for null).
- (d) Using Minitab to perform a significance test.
- (e) Using boxplots, stem-and-leaf, etc. to check the assumptions (symmetric, uni-modal, no outliers?) for significance tests; using these tools to compare distributions when the assumptions don't hold.

3. Price Indices and Time Series

- (a) What is a price index? How do you use it?
- (b) Features of a Time Series Plot: Trend, Seasonal Variation, Cycles, Fluctuations.
- (c) Interrupted Time Series.
- (d) Smoothing a Time Series.

▷ Hints for Answering Final Exam Questions:

How can you get the most points on exam questions? Here is a review of four important ideas that will help you do well on the final exam for Statistical Reasoning.

I. Be Complete

We expect you to demonstrate knowledge of all the features of each problem you solve on the exam. Give complete answers, cover all the bases. You don't have to write a novel, but by the same token, *don't throw points away by not writing enough.*

- Remember to mention things you don't see as well as those you do see. *If something is missing (like, no outliers), say it's missing.* Otherwise we can't tell if you looked for that thing or not.

II. Use Statistical Ideas to Support Arguments

The purpose of this course is to give you a working knowledge of the statistical concepts and the methods of statistical reasoning. We expect to see these ideas applied to the problems you are given to work on. Be as specific as possible, and support your assertions with statistical arguments.

- Use numerical summary measures along with visual descriptions in your arguments.
- Use words you have heard in class and seen on homework, labs and handouts in your descriptions and arguments.
- *Most of the time we want an answer that uses statistical tools you have learned.* Nonstatistical answers will usually not be good enough, unless you are thinking about *how* outliers got in the data, *whether* a causal argument can be made, or *what* lurking variables could be confounding a causal argument.

III. Show Your Work

We can't give partial credit for good thoughts that were only in your head and not written down on your test.

- If a problem asks for a calculation, show the work you did to arrive at the answer (*even if you did it all on the calculator, at least show us where the numbers go in the formula you used!*). If your answer was off but your method is right, we can at least give you partial credit.
- If a problem doesn't ask for a calculation (like a multiple choice question), but you are concerned that (a) your answer will be misinterpreted; or (b) you are thinking about it differently; write your reasoning in the margin on the test. If your answer is unexpected but your reasoning is sound, we can give you some credit in the problem.

IV. Review Handouts, Solutions, Labs and Examples

You should review handouts and solutions for examples of how to correctly and completely answer questions. There is no way that you can automatically know how to write a complete answer. You have to learn from studying examples of good answers. Read handouts and solutions critically. Compare your solutions to the ones that we provide.