

Math 121 – Statistics

Lecture 1 Introduction

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Hampden-Sydney College

Wed, Jan 13, 2016

Outline

- 1 Introduction
- 2 Grading
 - Homework
 - Quizzes
 - Tests
 - Final Grades
- 3 Attendance
- 4 Classroom Etiquette
- 5 Individuals and Variables
- 6 Categorical and Quantitative Variables
- 7 A Statistical Problem
- 8 Assignment

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Introduction

- Dr. Robb T. Koether
- Office: Bagby 114
- Office phone: 223-6207 (9:00 am - 5:00 pm)
- Home phone: 392-8604 (6:00 pm - 11:00 pm)
- e-mail: rkoether@hsc.edu
- Office hours: 1:30 - 3:20 MTW; Th 11:30 - 12:20; other hours by appointment.

Introduction

- Meeting time: MWF at 12:30; Th at 1:30.
- Meeting place: Bagby 022.
- Text: The Basic Practice of Statistics, 7th ed., by David Moore, et al.

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Homework

- Daily assignments.
 - Read the section.
 - Read the examples and work through them yourself.
 - As you read, work the problems labeled “Apply Your Knowledge.”
 - Do the assigned exercises at the end of the section.
- Do the homework every night; do not put it off.
- The sooner you do the homework, the easier it is and the more beneficial it is.

Homework

- If you are not able to work all the problems, then you need to seek help.
- Departmental tutors will be available Sunday through Thursday nights, 8:00 - 11:00, in Bagby 111, starting next week.

Quizzes

- There will be a quiz every Wednesday during the first 10 minutes of class.
- The quiz questions will be taken verbatim from the previous week's homework.
- No make-up quizzes will be given.
- In exchange for that awful, mean policy, I will drop the two lowest quiz grades.
- However, you may take a quiz *early* if you know that you will miss class.

Quizzes

- An industrious student should be able to obtain a nearly perfect quiz average.
- You have in advance *all* of the questions that might appear on the quizzes and you have their answers.
- You simply need to be sure that you have worked them and then reviewed them before the quiz so that you can reproduce the correct answers.
- A poor quiz average is a clear indication that the student is not doing the homework.

Tests

- There will be three tests

Test	Date
#1	Fri, Feb 12
#2	Fri, Mar 18
#3	Fri, Apr 15

Final Exam

- The final exam will be given on Tuesday, May 3 at 2:00 pm in Bagby 022.
- It will be cumulative.
- Everyone must take the final exam.
- It will not be rescheduled.
- Plan now to be there.

Final Grade

- Final grade in the course is a weighted average of the quiz average, the test average, and the final exam grade.

Component	Weight
Quiz avg.	30%
Test avg.	50%
Final exam	20%

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Attendance Policy

- I will check attendance every day.
- If you arrive after the bell, it is your responsibility to tell me after class that you arrived late.
- Two later arrivals count as one absence.
- Based on your attendance, I will take the following actions.

No. of Absences	Action
0 - 3	Raise final grade one part
4 - 6	No action
7 - 9	Lower final grade one part
> 9	Withdraw you with WF

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Classroom Etiquette

- Do not leave the room during the class. If necessary, use the bathroom before coming to class. If you are thirsty, get a drink before class.
- Do not use any electronic devices during class.

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Definition (Individual)

An **individual** is a member of the set of objects (people, things, etc.) that is described by the data.

Definition (Variable)

A **variable** is a characteristic of an individual. The data are the values that the variable takes on for the individuals in the set.

Example

Example (Tossing a coin)

- If we toss a coin several times to collect data,
 - What would be an “individual?”

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 - What would be a “variable?”

Example

Example (Tossing a coin)

- If we toss a coin several times to collect data,
 - What would be an “individual?”
 - What would be a “variable?”
 - What are the possible values of the variable?

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Categorical and Quantitative Variables

Definition (Quantitative Variable)

A **quantitative** variable is a variable whose values are numeric. The variable *measures* or *counts* something.

Definition (Categorical Variable)

A **categorical** variable is a variable whose values place the individual in a group or a category.

Categorical Variables

- The categories are typically labeled.
- It is possible that the labels are numerical, but that does not make the variable quantitative.
- Examples: SSN numbers, ISBN numbers, catalog numbers.

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Categorical Variables

- The categories are typically labeled.
- It is possible that the labels are numerical, but that does not make the variable quantitative.
- Examples: SSN numbers, ISBN numbers, catalog numbers.
- It does not make sense to perform calculations such as addition or averaging on categorical data.
- On the other hand, it does make sense to count the number of individuals in each category (**count data**).

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A Statistical Problem

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- I want to determine whether it is fair, i.e., does it land heads 50% of the time.

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- I have a coin.
- I want to determine whether it is fair, i.e., does it land heads 50% of the time.
- How do I test it for fairness?

A Statistical Problem

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- Suppose that I believe that the coin is not fair, that it lands heads either too often or not often enough?

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- How could I demonstrate that?

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- Suppose that I believe that the coin is not fair, that it lands heads either too often or not often enough?
- How could I demonstrate that?
- In the interest of time, I do not want to toss the coin more than 12 times.

A Statistical Problem

A Naive Approach

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- If I do not get 6 heads (out of 12 tosses), then I will conclude that the coin is not fair.

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A Naive Approach

- A naive approach would be to count the number of heads and see whether it is 6.
- If I do not get 6 heads (out of 12 tosses), then I will conclude that the coin is not fair.
- What is wrong with that approach?

A Statistical Problem

How Much Evidence?

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- It depends on what we mean by “prove.”

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- Would 12 heads out of 12 tosses *prove* that the coin is not fair?
- Would 0 heads out of 12 tosses *prove* that the coin is not fair?
- It depends on what we mean by “prove.”
- Why would 12 heads out of 12 tosses (or 1000 heads out of 1000 tosses) **statistically prove** that the coin is not fair?

A Statistical Problem

Allow for Randomness

- We must make a reasonable allowance for the uncertainty, i.e., **randomness**, in the tosses.

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- *That is the most important question in statistics.*

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- We must make a reasonable allowance for the uncertainty, i.e., **randomness**, in the tosses.
- We expect the number of heads to be close to 6, but not necessarily equal to 6.
- How close is close enough?
- *That is the most important question in statistics.*
- We need **probability theory** to answer that question.

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Assignment

Homework

- Read the syllabus carefully.
- Read Chapter 1: Individuals and Variables, pp. 1 - 6.
- Apply Your Knowledge: 1, 2.
- Check Your Skills: 13.
- Exercises: 23, 24.