

Focus on ST311, Introduction to Statistics

Hewlett Continuation: Spring 2001

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Background: Calif. State University, Northridge

- Ethnically diverse student population
- High percentage of students requiring remediation
- Department of Mathematics, Developmental Mathematics Program (serving over 4500 students each year)

Background: NC State University

- Lab Instructor, ST512 Statistical Methods
- Preparing the Professoriate: ST101H, Dr. Bill Swallow

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The Chronicle of Higher Education (1/19/2001)

"Loving Math Infinitely"

Dr. Josefina Alvarez, Professor of Math
New Mexico State University

- Mathematics Appreciation course
- Audience = Disgruntled Nonscience Majors
- 25 years of experience → no help!
- Solution:
 - Use *their* language
 - Convey the applicability of mathematics to *their* interests

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ST311, Introduction to Statistics

- Introductory service course for non-majors, no prerequisites
- About 10 sections offered each semester (n=65)
- Diverse audience (math abilities and class standing)
- *Aim for the middle*
- Objective: Provide an overview of statistical thinking, basic theory, and techniques.

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Goals for the Instructor

- Create a comfortable environment.
- Whenever possible, use *their* language.
- Convey the applicability of statistics to *their* interests.

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Create a comfortable environment

Target Outcomes: Habit of Inquiry, Critical Thinking

- Big class size → try to make it smaller (instructor is the key)
- Encourage questions, reward the questioner
“Do you have any questions?” → “What questions do you have for me today?”
- Take all responses from the audience, ~~unless~~ *especially* if it is wrong.
- “*This part is a little tricky, but it’s doable*”.
- Provide anonymous surveys during the semester.

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Whenever possible, use *their* language

Target Outcome: Help students think in relative terms.

Using Analogies

- Jaime Escalante, *Stand and Deliver*
- Developmental Math Program → Graduate Students
- Example: The Normal Distribution

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The Normal Distribution

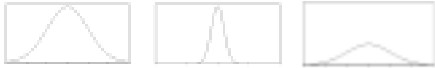
The normal distribution is a family of “bell shaped” density curves where a particular normal density is uniquely specified by **both** its mean (μ) and its standard deviation (σ). The mean specifies the center of the density and the standard deviation specifies its spread. All densities have the same overall shape.



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The Normal Distribution

The normal distribution is a **family** of density curves that are “bell shaped”.



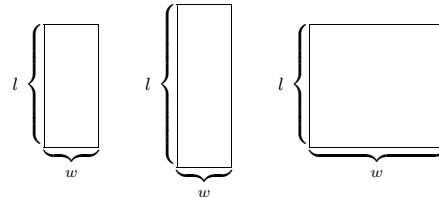
All normal curves have the same overall shape.

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An Aside: From Geometry — Rectangles

Rectangles are 4 sided figures with the special property that all sides meet at right angles → opposite sides have equal length.

For the family of rectangles, we can think of many examples:



All rectangles have the same overall shape.

Note: 2 pieces of information are needed to describe a particular rectangle:

- 1.) The Length (l)
- 2.) The Width (w)

Specifying only one of these is not enough – we need **both** quantities.

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As we’ve seen, when we think of the **family** of normal curves there are many examples. To describe a particular normal curve, as with rectangles, we need 2 pieces of information:

- 1.) The Mean (μ)
- 2.) The Standard Deviation (σ)

Specifying only one of these is not enough!

μ specifies the location of center of the normal curve.

σ specifies the spread of the normal curve.

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- A good analogy can help dispel any mystery that may lurk behind a new concept.
 - This should help pave the road to “doability”.

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Convey the applicability of statistics to *their* interests.

Target Outcome: Instill a vested interest on a personal level.

Statistical Time Outs

- “How is statistics useful for me?”
- Involve students by using their data.
- Examples are based upon represented majors.
- Analysis on such data is much more interesting for them.
- **Free Lunch!**

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Statistical Time Out Topics

Biological Sciences ⇒ Comparison of Varieties of Corn
Sociology ⇒ Seeking Correlations in Personal Relationships
Public Health ⇒ Proportion of Illegal Drug Usage Among Class Members
Mathematics ⇒ Probability and the Birthday Problem
Criminology ⇒ DNA Forensics and Statistical Genetics
Ethics ⇒ 'Sham' Surgery of Clinical Trials, Research Cover-ups
English/History ⇒ Statistical Analysis of Disputed Authorship

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Conclusion

- Lots to improve upon, plenty of room to grow
- Many positive ideas (*almost too many*) both from the Hewlett gatherings and PTP experiences
- *Statistical Time Out*

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Additional comments: (Survey 1, Spring 2001)

“Interesting course, lot to talk about, I normally hate math, but this is cool. Sorry I missed like 2 days of class, I was sick and I was really tired.”

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