Assessing Student Learning in Introductory Statistics: An Authentic Assessment Approach

I. Background on the Scholarship of Teaching and Learning

II. Review of Goals of Group Homework Projects

III. Assessment Challenges

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I. Background on the Scholarship of Teaching and Learning (SoTL)

A. Scholarship of Teaching and Learning
   1. Investigates the impact on student learning of innovative materials
   2. Asks the question, "What have **my** students learned?"
   3. Redefines a "Teaching Problem" as an opportunity for understanding

B. Scholarly Teaching
   1. Attends conferences on teaching
   2. Develops innovative curriculum materials
   3. Makes those materials public

C. Campus Conversations Program
   1. As of Fall 2002, approximately 200 campuses have signaled they are working actively to foster the scholarship of teaching and learning by registering at the AAHE site http://aahe.ital.utexas.edu/
   2. Leading institutions include Youngstown State University, Indiana University (Bloomington), Notre Dame University, Portland State University

D. Carnegie Foundation for the Advancement of Teaching and Learning
   1. 1997 received a grant from the Pew Charitable Trust to begin the Carnegie Scholars Program
   2. Goals of Program
      a. Foster significant and long-lasting learning for all students
      b. Enhance the practice and profession of teaching
      c. Bring to faculty members' work as teachers the recognition and reward afforded to other forms of scholarly work
   3. K-12 and College/University Programs
   4. University Program Logistics
      a. Application process that involves the description of a SoTL project
      b. First class was June 1998
      c. My cohort began June 2000 with 39 other scholars
      d. Current program seeks applicants interested in liberal education: http://www.carnegiefoundation.org/CASTL/highered/scholars_program.htm (Fall 2004 application deadline)
      e. Sponsored residencies in June, January, and the following June

E. Fuzzy Classification of SoTL (Taken from Opening Lines by Pat Hutchings)

   1. What works? – Seeking evidence about the relative effectiveness of different approaches. This is more classic, is teaching this way "better" than teaching another way.
   2. What Is? – A thorough description of a particular approach or intervention. Often involves trying to understand student perception of materials.
   3. Visions of the Possible – trying to understand how to bring students to a certain level of understanding or engagement of the subject matter.

4. New frameworks for shaping thought about practice. Building a theory on how an approach or innovation impacts student learning.
5. Overlap. A research project in SOTL can contain several of these elements.

F. Relationship with the Education Community
   1. SoTL as a bridge
   2. Alarm and dread
   3. Legitimate discussion

II. Goals of the Projects

A. DO THESE PROJECTS WORK???
B. DO THEY WORK AT WHAT?
   1. Students gaining valuable experience with real data
   2. Students acquiring communication skills by writing technical reports that summarize results clearly and concisely
   3. Students learning how to use statistical and word processing software as tools to solve problems and communicate results
   4. Students acquiring skills in working with others
   5. Students learning to apply appropriate methodology
   6. Basically, can students DO statistics when they leave my course??????????

III. Assessment Challenges
A. How would I compare a class with projects to a traditional class?
   1. Would it be ethical?
   2. Traditional examinations do not have students actually "do" statistical analysis
   3. Can I test students from a traditional course with a take home data analysis project when they have had not training on how to prepare such a project?
   4. Painter example?
   5. Article in Ethics of Inquiry, Issues in the Scholarship of Teaching and Learning (Pat Hutchings, editor)
B. How does one evaluate team written projects for assessing student learning?

IV. Authentic Assessment Definition
A. The Assessment Challenge in Statistics Education, edited by Iddo Gal and Joan Garfield, IOS Press.
B. Colvin, S., and Vos, K., "Authentic Assessment Models for Statistics Education"
   1. "It [authentic assessment] claims to measure by direct means the student performance on tasks that are relevant to the student outside of the school setting,"
   2. Adapting to the "outside of the intro class setting"

V. Main Assessment Tool

A. Individual take home mid-term and final exams that require students to:
   1. summarize the data
   2. visualize the data
   3. conjecture results
   4. test hypotheses
   5. formulate hypotheses
   6. write their results in a report

B. Goal: determine what percentage of students are achieving a threshold of understanding how to do such a statistics project

C. Caveat: Does not prove something is "better" than something else

D. Topics
   1. Emu Taste tests comparing emu meat to beef and turkey
   2. first year college student nutrition study
   3. osteoporosis and bone mass density
   4. calcium, phosphorous, and alkaline phosphatase levels in the elderly

E. 21 unique data sets

F. Students use same data on mid-term and final

G. Grading rubric same as the homework

Exam II – Take Home

First Year College Student Nutrition Study

The data for your project comes from a nutritional study conducted at Youngstown State University during 1997-1998. Forty four subjects completed the study in which body measurements and nutrition data was collected at the beginning of the Fall semester and then again in the Spring semester. A portion of that data appears in the data file nutri1a.xls which is available at http://csuohio.edu/holcombj/mth147/exam2.htm Note that some variables may not be used for this assignment, but may be used for the take-home Final Examination.

Variable guide:

studynum	An identifying number to keep track of subjects
gender	0=male, 1=female
residenc	0=on-campus, 1=off-campus
athlete	0=non-athlete, 1=athlete
heightf	Height in cm in the Fall semester
weightf	Weight in kg in the Fall semester
weights	Weight in kg in the Spring semester
bmifall	Body Mass Index in the Fall semester
weightch	Change in Weight from Fall to Spring (weights-weightf)
wt10	0=no, 1=yes for weight change over 10lbs.
bmi25f	0=no, 1=yes, for bmi over 25 in the Fall

The main purpose of the study was to examine weight and nutrition characteristics in the college first year population. One the variables examined was the change in weight from the fall to the spring. The variable **weightch** above is a variable that indicates whether the student gained more than 10 lbs during the first year (**weightch=1)** or did not (**weightch=0**).

Body Mass Index is a variable that is calculated by taking the weight in kg and dividing by height squared (note height must be in meters). Generally a BMI between 20 and 25 is considered good. BMI is a variable that indicates a person might be at risk for potential obesity. It does not apply in all situations, since many athletes might have a high BMI index as a result of a great amount of muscle mass. For the Fall semester, the variable **bmi25f=1** indicates a student has a BMI over 25, and **bmi25f=0** indicates a person has a BMI 25 or less.

Begin your report by providing a summary of the discrete variables (raw numbers and percents), and a table summary of the continuous variables of **heightf**, **weightf**, and **bmifall** (5 number summary and histogram). Determine the shape of the histograms and comment on whether the mean or median is a better measure of center.

Create a 2x2 contingency table of **athlete** vs. **wt10**. Let A be the event of being an athlete and B be the event of gaining 10 or more pounds during the first year. Determine the following:

1. P(A) 2. P(B) 3. P(A∩B) 4. P(A∪B)

5. P(B|A) 6. P(B|A′)

Now we will consider not being an athlete (A′) as a risk factor and gaining more than ten pounds as the disease (B). Calculate the prevalence ratio and interpret its meaning.

Create a 2x2 contingency table of **athlete** vs. **bmi25f**. Let A be the event of being an athlete and B be the event of having a BMI over 25 during the fall semester. Determine the following:

1. P(B) 2. P(A∩B) 3. P(A∪B)

4. P(B|A) 5. P(B|A′)

Now we will consider being an athlete (A) [note the change from above] as a risk factor and having a BMI greater than 25 the disease (B). Calculate the prevalence ratio and interpret its meaning.

Write a summary paragraph of at least five sentences that reports any of the findings that you find interesting or surprising. Also propose two additional variables that could have been measured with this study and describe how the measurement would have taken place.

Final Exam – Take Home

Consumer Comparison of Beef, Turkey, and Emu Meat

The data for your project comes from a nutritional study conducted at Ohio University during 1997-1998. Eighty four subjects completed the study in which subjects evaluated variables describing beef, turkey, and emu. Each of the three meats was prepared with taco flavoring and subjects were asked to rate the appearance, tenderness, flavor, texture, aftertaste, and overall acceptability. Cleansing of the palate after each taste with tepid (room temperature) water was required. The raters used a scale that had nine choices: 1=like extremely; 2= like very much; 3=like moderately; 4=like slightly; 5=neither like nor dislike; 6=dislike slightly; 7=dislike moderately; 8= dislike very much; and 9=dislike extremely.

A portion of that data appears in the data file **emu1a.sav** which is available at http://csuohio.edu/holcombj/mth147/finalexam.htm

Variable guide:

subject	An identifying number to keep track of subjects
gender	1=male, 2=female
Age	Age in years
educlev	1=no college, 2=some college, 3=Bachelors Degree, 4=Post-Bachelors
income	1=<$10,000; 2=10,000-14999; 3=15,000-24,999; 4=25,000-34,999 5=35,000-49999, 6=50,000-74999 7=>=75,0000
areagrow	1=rural, 2=urban
flavbeef	Beef Flavor Rating
flavemu	Emu Flavor Rating
flavturk	Turkey Flavor Rating
likeemu	0=no, 1=yes
likebeef	0=no, 1=yes
liketurkey	0=no, 1=yes
count	Just a variable of 1's
Bins	Bins for Histogram on Ratings

The variables **likeemu**, **likebeef**, and **liketurkey** are calculated from their respective flavor variables. If the flavor score was 1-4, then the like variable is 1 (yes), and if the score was 5-9, the like variable is 0 (no).

For the following tests of Hypothesis, be sure to state the hypotheses, the test statistic, the P-value or the P-value estimate, and your conclusion.

1. Assume that the subjects are a random sample of consumers. Is there sufficient evidence to conclude that after the tasting the emu meet, the percentage of subjects who liked emu (**likeeumu**) meat is over 40%?
2. Is there sufficient evidence to conclude that after the tasting the turkey meat, the percentage of subjects who liked turkey (**liketurkey**) meat is over 75%?
3. Determine if gender and liking emu meat are independent.
4. Treat **flavemu,** as a continuous variable. Create a scatterplot of **age** predicting **flavemu**. Do you think **age** is useful in predicting **flavemu**? Perform a formal test of hypotheses. What is your conclusion?

Write a paragraph that describes your conclusions. Also, perform some kind of a test of hypothesis that I have not proposed. This could be a test involving a mean, a proportion, independence, or it could involve a regression analysis. Clearly state your null, alternative, test statistic, P-value, and conclusion.

VII. Results

A. Take Home Midterm Scores

```
 5|3
 5|
 6|
 6|
 7|24
 7|9
 8|1133
 8|5677
 9|0000011222344
 9|555557889
10|0
```

5|3=53 and 10|0=100

- Have 31/35 (88.6%) achieving a score of 80 or better

Observations during exam process

- 10 students had software issues in office hours
- 6 students in my notes had serious Excel issues – but 2 of those did work on the projects themselves
- 12 students missed points because of weak or no introduction
- 6 students had undesired output in their report for which I took pts off when grading projects I and II
- 2 students admitted they did not know how to calculate percents

B. Take Home Final Results

```
 6|0
 6|5
 7|
 7|8
 8|000124
 8|5667899
 9|1124
 9|55566677889
10|00
```

6|0=60 and 10|0=100

Two students earned 0's.

- 30 of 35 students (86%) earned a score of 80 or better.

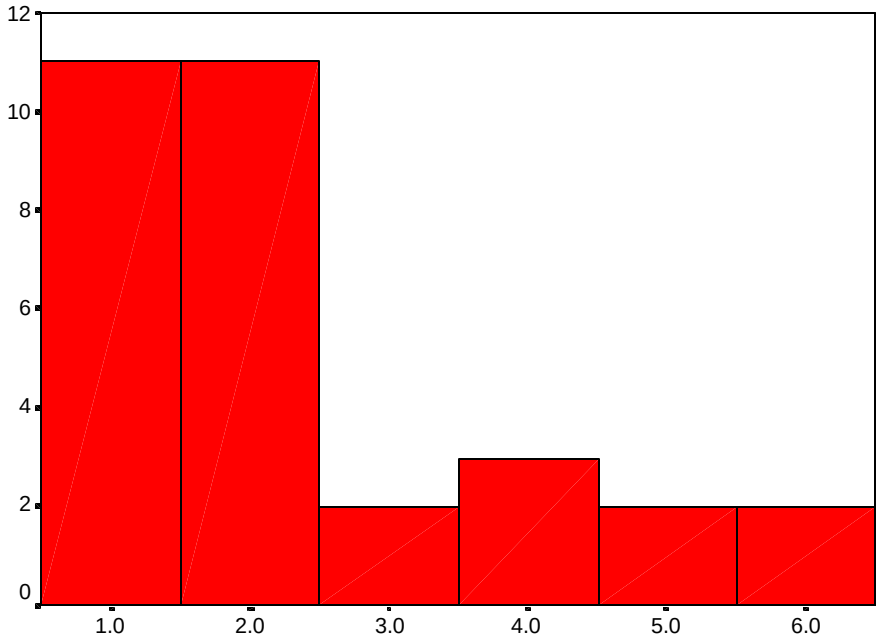
Concept issues:

- One student did not know the difference between an outlier and an influential observation
- two students did not know what to do with the test statistic for the chi-square test
- One student did not know what model meant (slope and intercept)

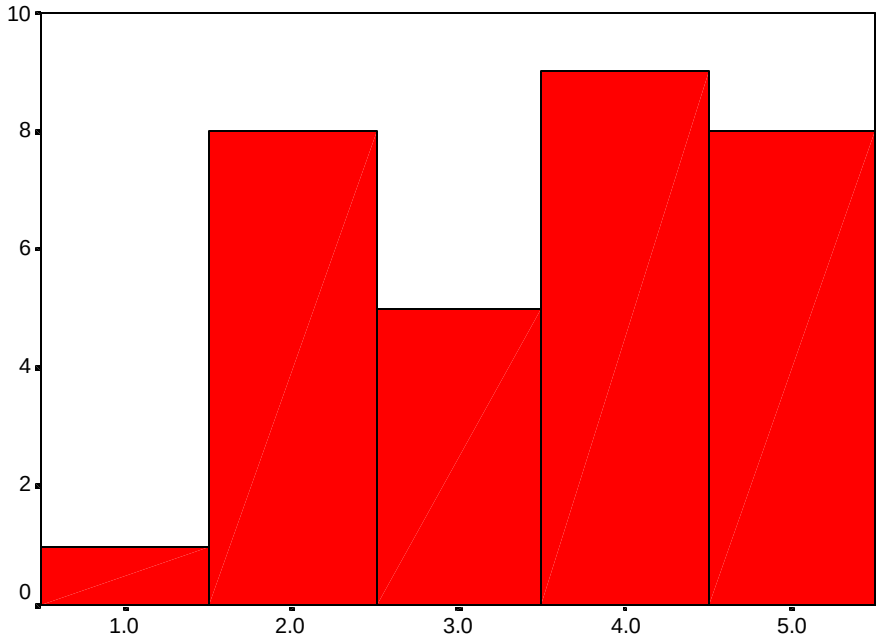
Concept and Software issues

- One student does not know how to do regression in any way
- One student did not know what to do at all with the hypothesis question on a mean
- One student did not know what to do at all with the hypothesis question on a proportion
- Three students do not know how to test independence of two categorical variables

VIII. Interesting Survey Results

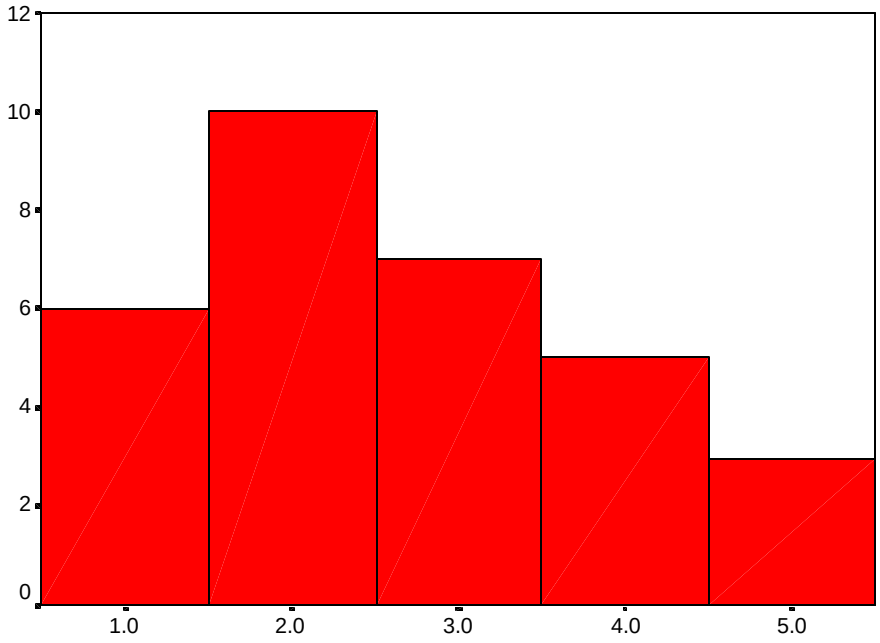


Team Projects adqueately prepared for Midterm

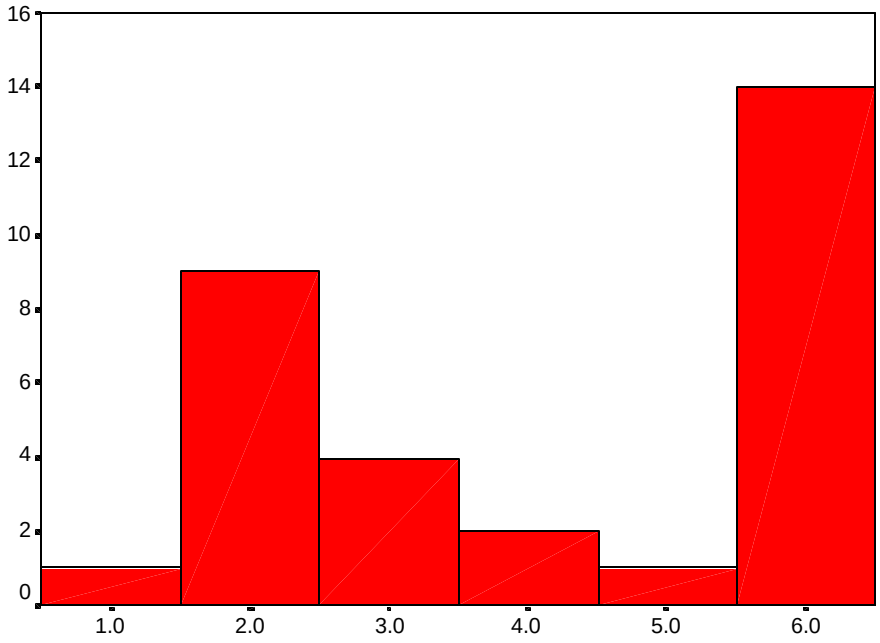


Take-home exam was too difficult

1=Strongly Agree 2=Mildly Agree 3=No opinion
4=Mildly Disagree 5=Strongly Disagree

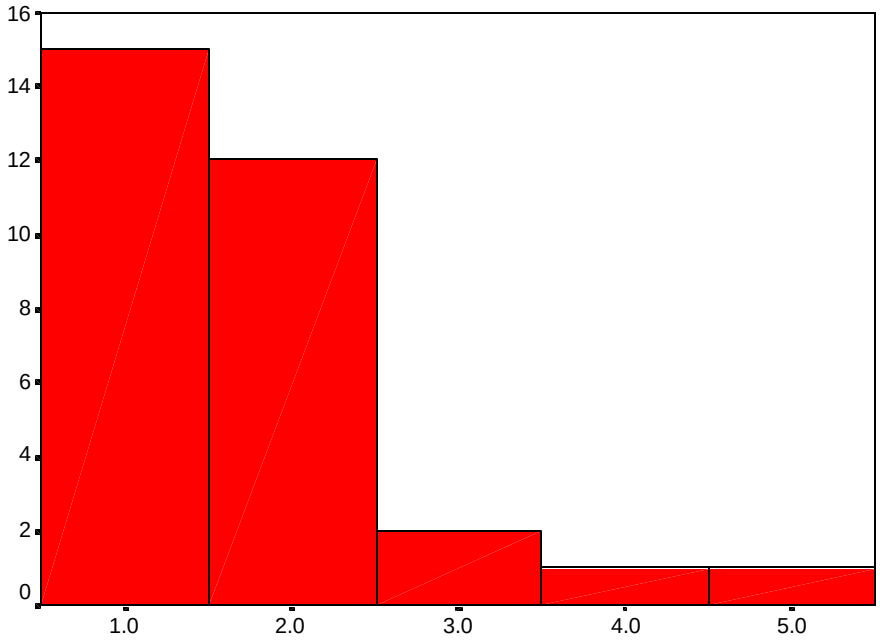


I found making time to work with my team very difficult

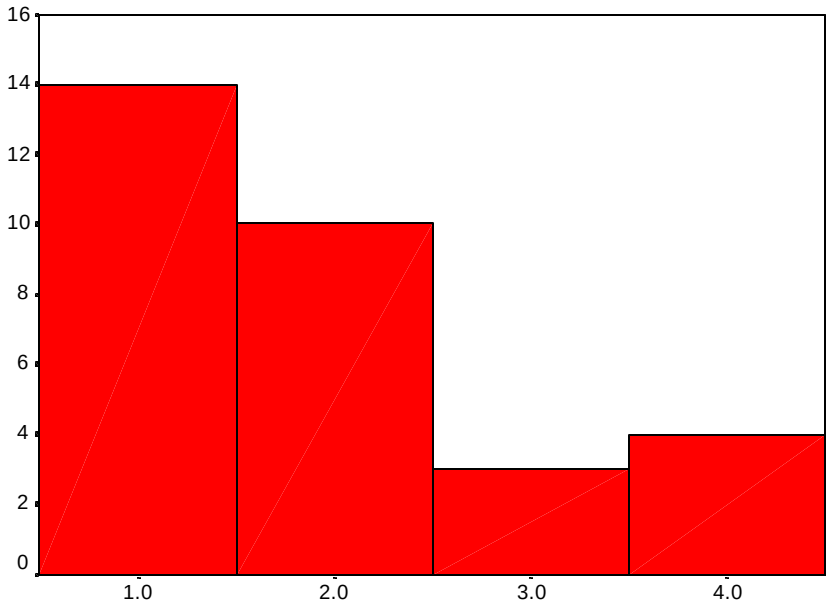


Working on projects prepared me for future team work

1=Strongly Agree 2=Mildly Agree 3=No opinion
4=Mildly Disagree 5=Strongly Disagree

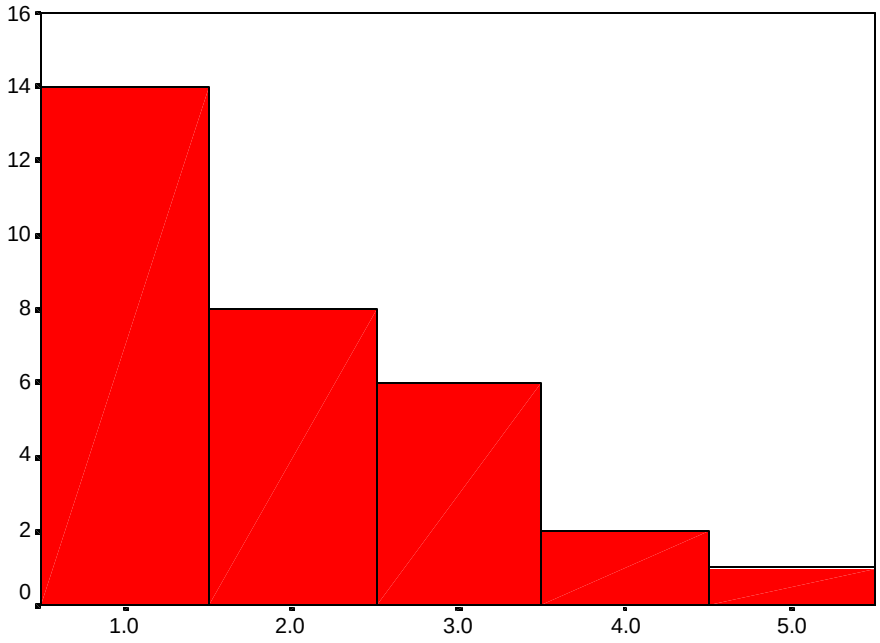


Confident to do a summary analysis

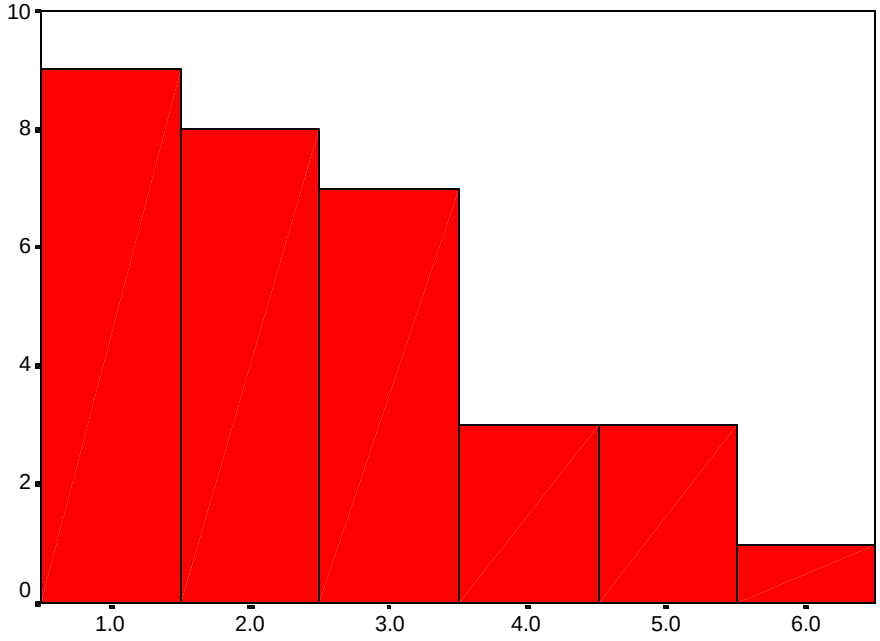


Confident to do a regression analysis

1=Strongly Agree 2=Mildly Agree 3=No opinion
4=Mildly Disagree 5=Strongly Disagree



Can write a satisfactory data report for another course



The Projects will help me in my major and/or career

1=Strongly Agree 2=Mildly Agree 3=No opinion
4=Mildly Disagree 5=Strongly Disagree

IX. Web Resources

http://academic.csuohio.edu/holcombj/projects/exams.htm

Take-Home Data Sets and Exams

Zipped file of all files on this web page.

nutri1.xls	nutri2.xls	nutri3.xls	nutri4.xls	nutri5.xls	nutri6.xls
osteo1.xls	osteo2.xls	osteo3.xls	osteo4.xls	osteo5.xls	osteo6.xls
emu1.xls	emu2.xls	emu3.xls	emu4.xls	emu.xls	emu6.xls
ranges1.xls		ranges2.xls		ranges3.xls	

nutri1.mtw	nutri2.mtw	nutri3.mtw	nutri4.mtw	nutri5.mtw	nutri6.mtw
osteo1.mtw	osteo2.mtw	osteo3.mtw	osteo4.mtw	osteo5.mtw	osteo6.mtw
emu1.mtw	emu2.mtw	emu3.mtw	emu4.mtw	emu5.mtw	emu6.mtw
ranges1.mtw		ranges2.mtw		ranges3.mtw	

Take-home Midterm Exams (with Answers)

nutri1.doc	nutri2.doc	nutri3.doc	nutri4.doc	nutri5.doc	nutri6.doc
osteo1.doc	osteo2.doc	osteo3.doc	osteo4.doc	osteo5.doc	osteo6.doc
emu1.doc	emu2.doc	emu3.doc	emu4.doc	emu5.doc	emu6.doc
ranges1.doc		ranges2.doc		ranges3.doc	

nutri1.pdf	nutri2.pdf	nutri3.pdf	nutri4.pdf	nutri5.pdf	nutri6.pdf
osteo1.pdf	osteo2.pdf	osteo3.pdf	osteo4.pdf	osteo5.pdf	osteo6.pdf
emu1.pdf	emu2.pdf	emu3.pdf	emu4.pdf	emu5.pdf	emu6.pdf
ranges1.pdf		ranges2.pdf		ranges3.pdf	

Take Home Final Exams (with Answers)

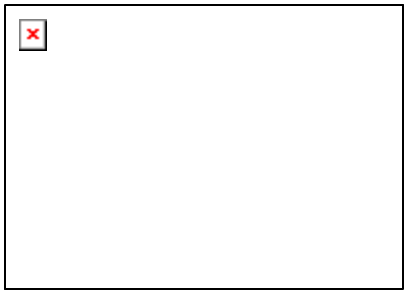
nutri1_fin.doc	nutri2_fin.doc	nutri3_fin.doc	nutri4_fin.doc	nutri5_fin.doc	nutri6_fin.doc
osteo1_fin.doc	osteo2_fin.doc	osteo3_fin.doc	osteo4_fin.doc	osteo5_fin.doc	osteo6_fin.doc
emu1_fin.doc	emu2_fin.doc	emu3_fin.doc	emu4_fin.doc	emu5_fin.doc	emu6_fin.doc
ranges1_fin.doc		ranges2_fin.doc		ranges3_fin.doc	

nutri1_fin.pdf	nutri2_fin.pdf	nutri3_fin.pdf	nutri4_fin.pdf	nutri5_fin.pdf	nutri6_fin.pdf
osteo1_fin.pdf	osteo2_fin.pdf	osteo3_fin.pdf	osteo4_fin.pdf	osteo5_fin.pdf	osteo6_fin.pdf
emu1_fin.pdf	emu2_fin.pdf	emu3_fin.pdf	emu4_fin.pdf	emu5_fin.pdf	emu6_fin.pdf
ranges1_fin.pdf		ranges2_fin.pdf		ranges3_fin.pdf	

X. Assessment Resources Tools for Improving Statistical Thinking (ARTIST)

A. NSF-Sponsored Project
B. Principal Investigators
    1. Joan Garfield – University of Minnesota
    2. Robert DelMas – University of Minnesota
    3. Beth Chance – Cal Poly San Luis Obispo
C. Advisory Group
    1. Julie Clark - Hollins University
    2. George W. Cobb - Mount Holyoke College
    3. John P. Holcomb, Jr. - Cleveland State University
    4. Frances Lawrenz - University of Minnesota
    5. Carl Lee - Central Michigan University
    6. Marsha Lovett - Carnegie Mellon University
    7. Anthony Onwuegbuzie - University of South Florida
    8. Roxy Peck - California Polytechnic State University
    9. Michael Rodriguez - University of Minnesota
    10. Allan Rossman - California Polytechnic State University
    11. Deborah J. Rumsey - Ohio State University
    12. Candace Schau - CS Consultants

D. Goals of the Project
    1. A collection of high quality assessment items and tasks, coded according to content (e.g., normal distribution, measures of center, bivariate data) and type of cognitive outcome (e.g., statistical literacy, reasoning, or thinking).
        - http://www.gen.umn.edu/artist/index.html



Web ARTIST Glossary

Home Page

ARTIST News and Events

Roundtable

Performance Task Statistical literacy Statistical reasoning

Statistical thinking

Conference

Assessment Builder

Questions and Answers

Resources

Ways to participate

Feedback

Publications and Presentations

ARTIST Glossary

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Participants' Page

Advisors' Page

Performance task:

A performance task is a type of authentic assessment, in that it is modeled after a real life statistical problem or task. In the ARTIST database, a performance task is an item that gives students the opportunity to demonstrate their ability to integrate and apply statistical knowledge and skills in analyzing information. It is a way for students to demonstrate their ability to think statistically and construct a solution to a problem that includes relevant information about a statistical question and is accompanied by either raw data, summary statistics, and/or discussion of design issues. The problem challenges students to select an appropriate statistical procedure, use evidence to support a statistical conclusion, consider all relevant aspects of a statistical problem, or knowledgeably critique and evaluate a problem solution. These items are best scored using a holistic rubric that focuses on the overall approach and communication as well as the problem solution. Here are some questions to consider when evaluating students' answers:

1. Was an appropriate statistical procedure used to solve this problem?
2. Were necessary assumptions tested?
3. Were statistical analyses carried out correctly?
4. Were appropriate graphs used?
5. Was the conclusion stated appropriately and in terms of the problem context?
6. Was appropriate evidence supplied to justify the conclusion?
7. Were the explanations thorough and consistent?

Each of these components could be scored on the following scale:

0 missing or completely incorrect/not relevant to the problem

1 partially correct

2 mostly correct

3 essentially correct

Statistical literacy:

Statistical literacy includes basic and important skills that may be used in understanding statistical information or research results. These skills include being able to organize data, construct and display tables, and work

with different representations of data. Statistical literacy also includes an understanding of concepts, vocabulary and symbols, and includes an understanding of probability as a measure of uncertainty.
(Reference) (Examples)

Statistical reasoning:

Statistical reasoning may be defined as the way people reason with statistical ideas and make sense of statistical information. This involves making interpretations based on sets of data, representations of data, or statistical summaries of data. Statistical reasoning may involve connecting one concept to another (e.g., center and spread) or may combine ideas about data and chance. Reasoning means understanding and being able to explain statistical processes and being able to fully interpret statistical results.
(Reference) (Examples)

Statistical thinking:

Statistical thinking involves an understanding of why and how statistical investigations are conducted and the “big ideas” that underlie statistical investigations. These ideas include the omnipresent nature of variation and when and how to use appropriate methods of data analysis such as numerical summaries and visual displays of data. Statistical thinking involves an understanding of the nature of sampling, how we make inferences from samples to populations, and why designed experiments are needed in order to establish causation. It also includes an understanding of how models are used to simulate random phenomena, how data are produced to estimate probabilities, and recognition of how, when, and why existing inferential tools can be used to aid an investigative process. Statistical thinking also includes being able to understand and utilize the context of a problem in forming investigations and drawing conclusions, and recognizing and understanding the entire process (from question posing to data collection to choosing analyses to testing assumptions, etc.). Finally, statistical thinkers are able to critique and evaluate results of a problem solved or a statistical study.
(Reference) (Examples)

This page was created by Ann Ooms (ooms0001@umn.edu) on July 8, 2003 and was last modified on February 2, 2004.

ARTIST

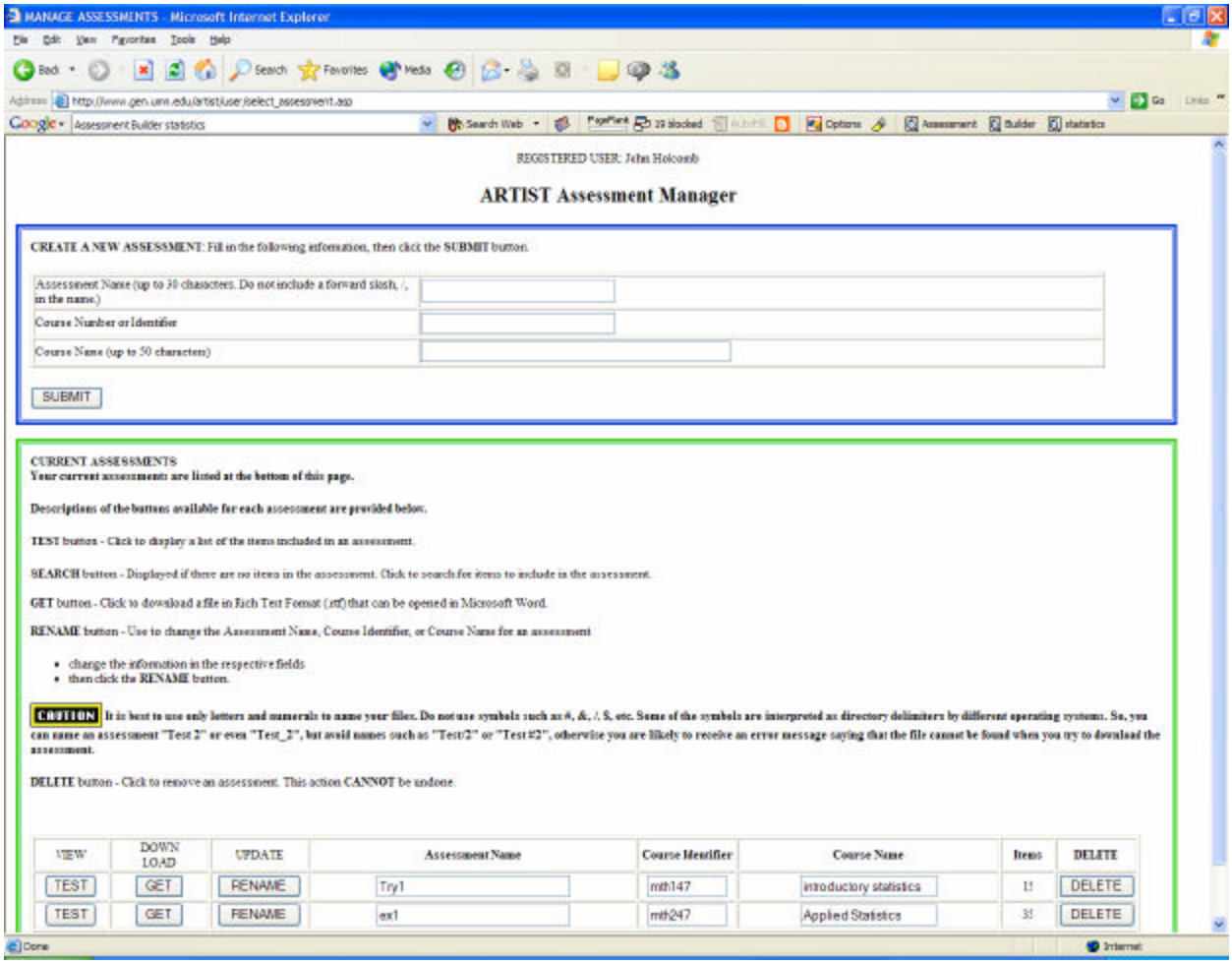
Assessment Builder

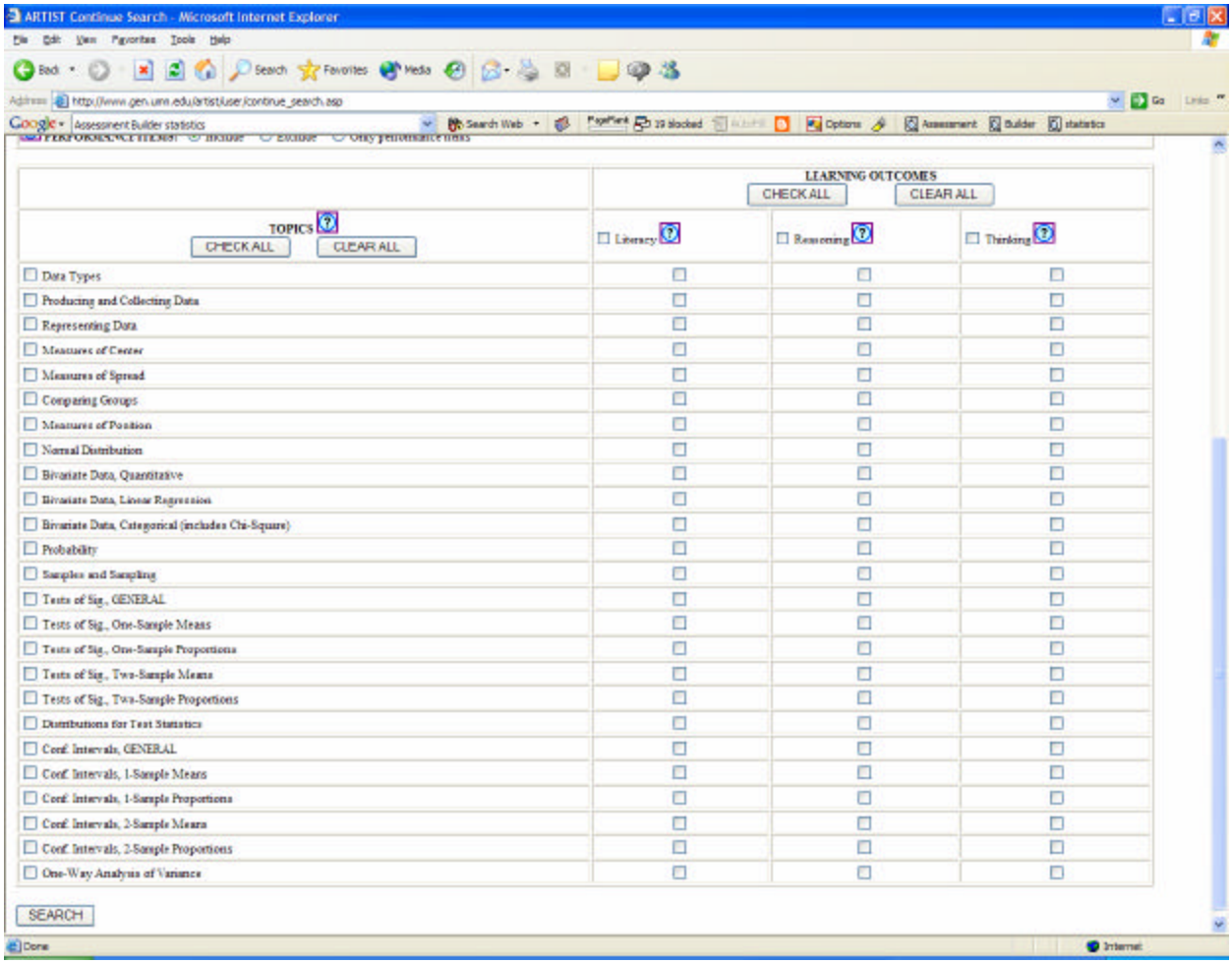
Log In

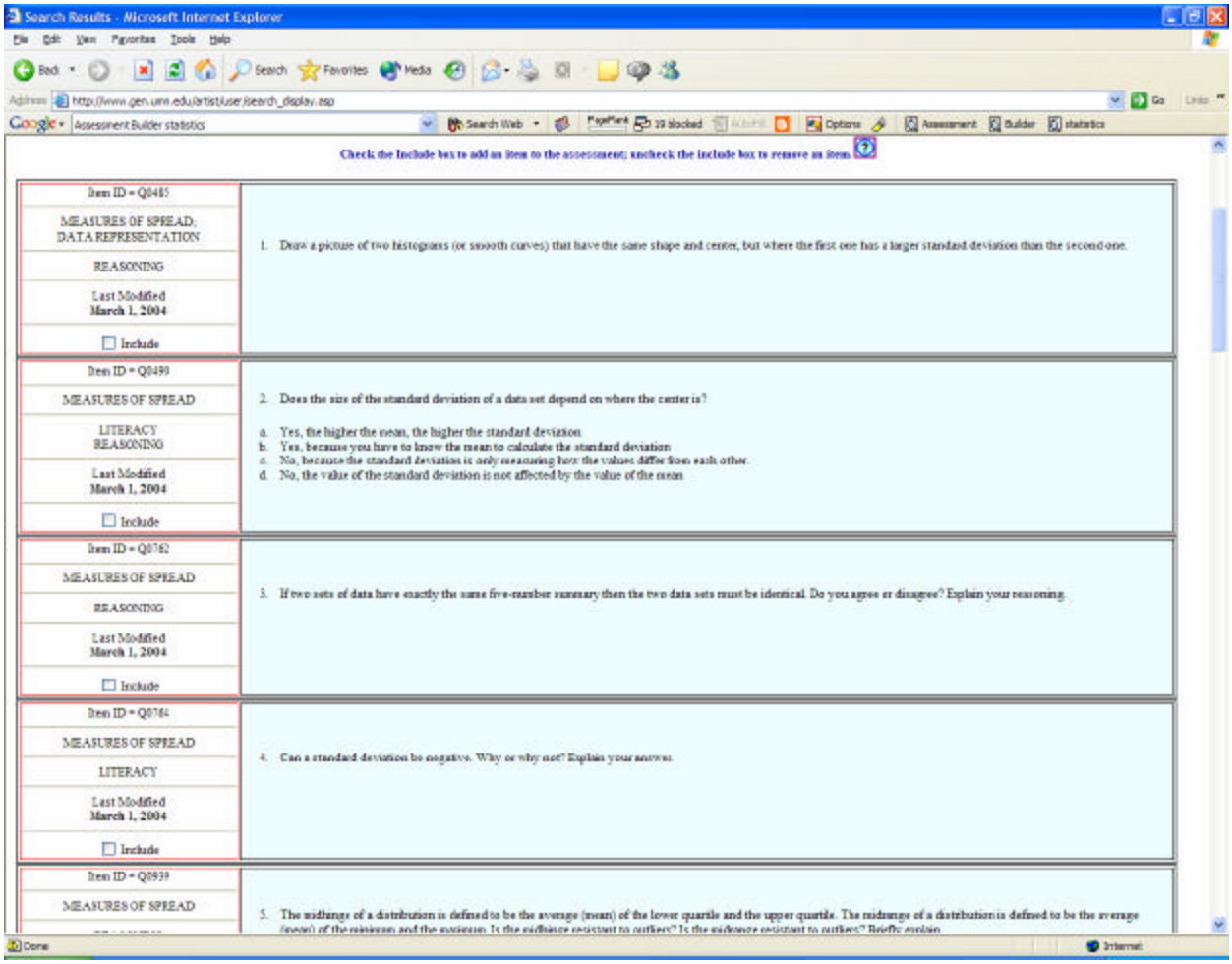
If you are a first time user of the ARTIST Assessment Builder, click the REGISTER button.

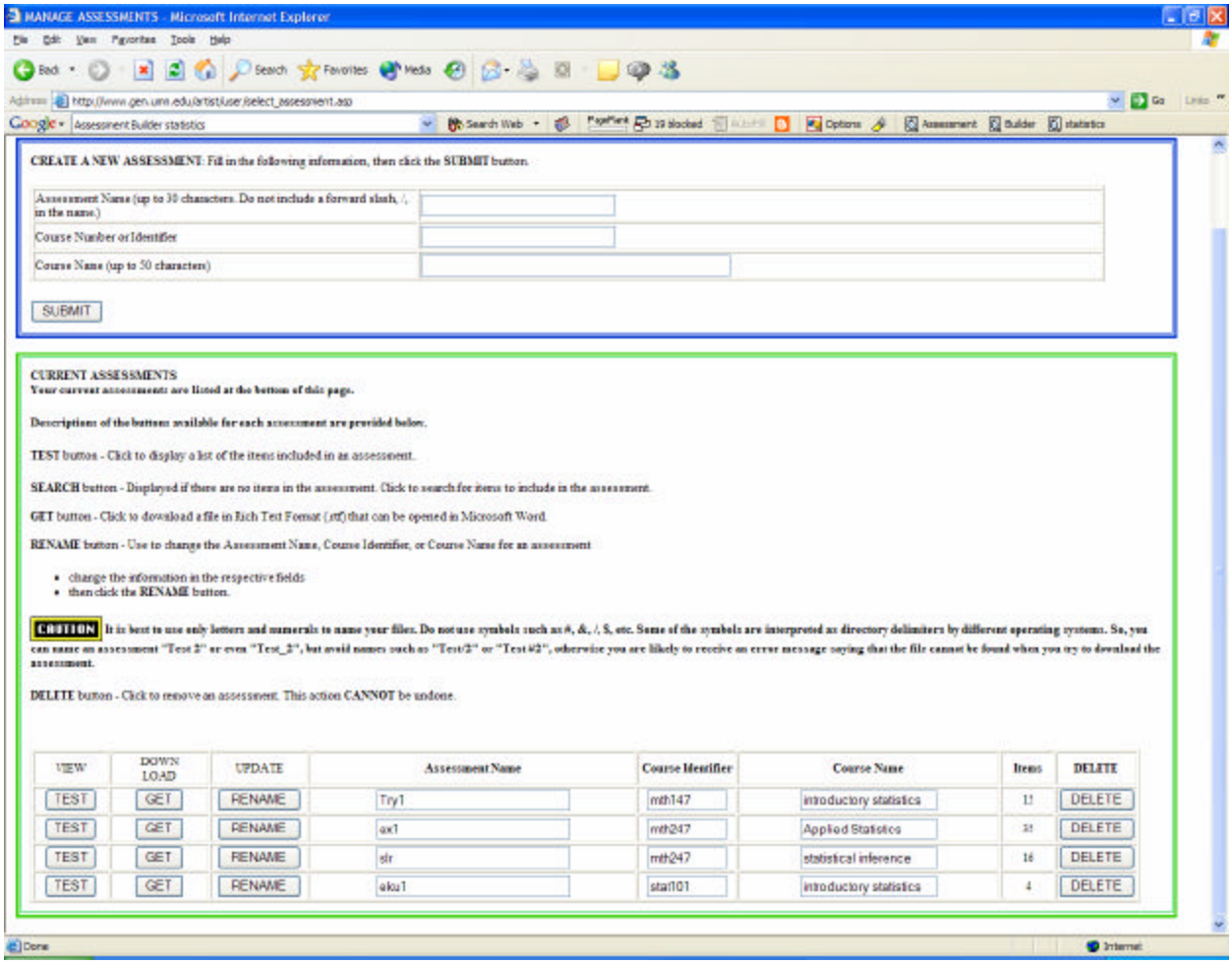
If you are a registered user of the ARTIST Assessment Builder, enter the following information and click the LOG IN button.

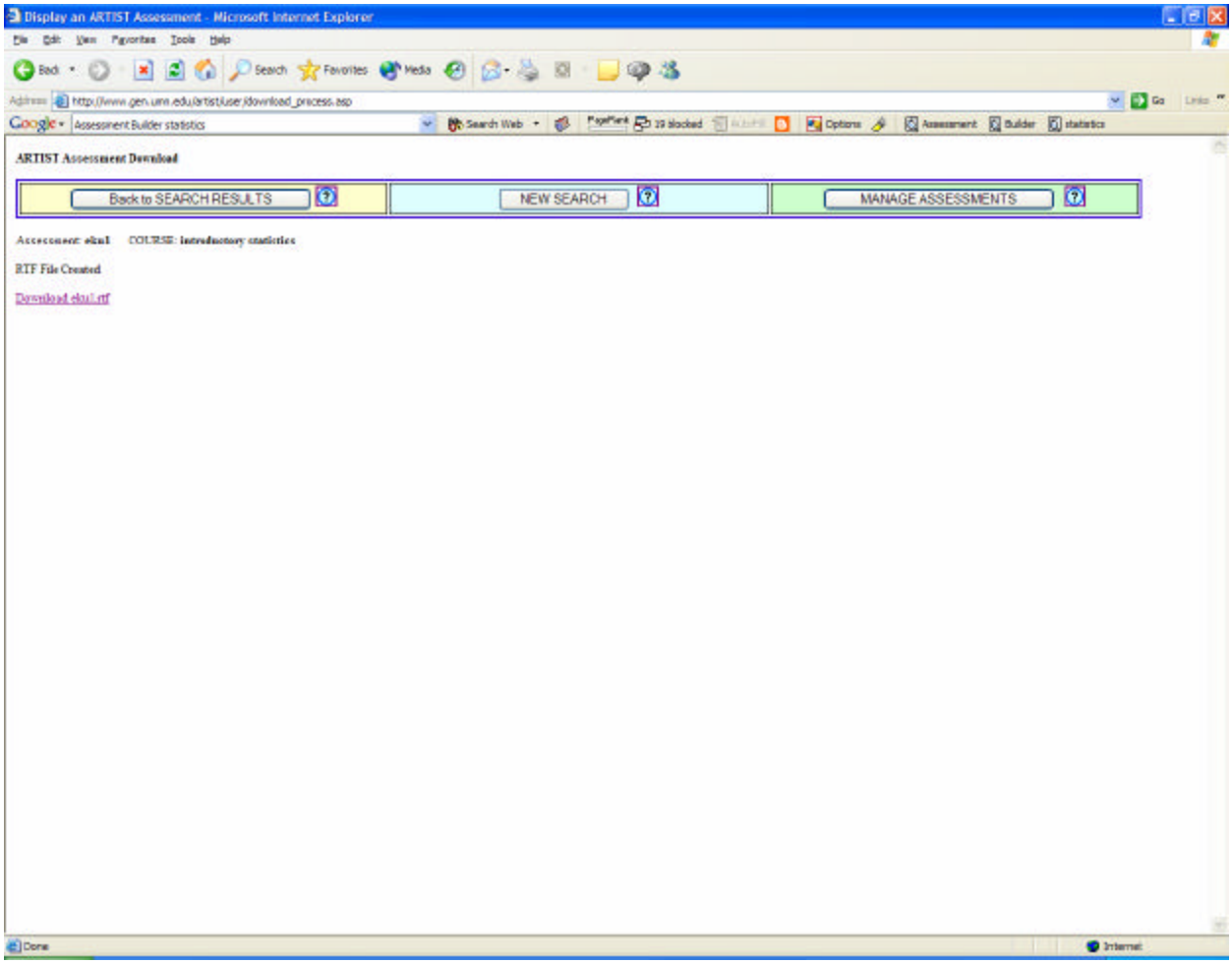
email address	
Password	


MANAGE ASSESSMENTS - Microsoft Internet Explorer
REGISTERED USER: John Holcomb
ARTIST Assessment Manager
CREATE A NEW ASSESSMENT: Fill in the following information, then click the SUBMIT button.
Assessment Name (up to 30 characters. Do not include a forward slash, /, in the name.)
Course Number or Identifier
Course Name (up to 50 characters)
SUBMIT
CURRENT ASSESSMENTS
Your current assessments are listed at the bottom of this page.
Descriptions of the buttons available for each assessment are provided below.
TEST button - Click to display a list of the items included in an assessment.
SEARCH button - Displayed if there are no items in the assessment. Click to search for items to include in the assessment.
GET button - Click to download a file in Rich Text Format (.rtf) that can be opened in Microsoft Word.
RENAME button - Use to change the Assessment Name, Course Identifier, or Course Name for an assessment
change the information in the respective fields
then click the RENAME button.
CAUTION It is best to use only letters and numerals to name your files. Do not use symbols such as #, &, /, $, etc. Some of the symbols are interpreted as directory delimiters by different operating systems. So, you can name an assessment "Test 2" or even "Test_2", but avoid names such as "Test/2" or "Test#2", otherwise you are likely to receive an error message saying that the file cannot be found when you try to download the assessment.
DELETE button - Click to remove an assessment. This action CANNOT be undone.
VIEW
DOWN LOAD
UPDATE
Assessment Name
Course Identifier
Course Name
Items
DELETE
TEST
GET
RENAME
Try1
mth147
introductory statistics
11
DELETE
TEST
GET
RENAME
ex1
mth247
Applied Statistics
31
DELETE


ARTIST Continue Search - Microsoft Internet Explorer
LEARNING OUTCOMES
CHECK ALL
CLEAR ALL
TOPICS
CHECK ALL
CLEAR ALL
Literacy
Reasoning
Thinking
Data Types
Producing and Collecting Data
Representing Data
Measures of Center
Measures of Spread
Comparing Groups
Measures of Position
Normal Distribution
Bivariate Data, Quantitative
Bivariate Data, Linear Regression
Bivariate Data, Categorical (includes Chi-Square)
Probability
Samples and Sampling
Tests of Sig., GENERAL
Tests of Sig., One-Sample Means
Tests of Sig., One-Sample Proportions
Tests of Sig., Two-Sample Means
Tests of Sig., Two-Sample Proportions
Distributions for Test Statistics
Conf. Intervals, GENERAL
Conf. Intervals, 1-Sample Means
Conf. Intervals, 1-Sample Proportions
Conf. Intervals, 2-Sample Means
Conf. Intervals, 2-Sample Proportions
One-Way Analysis of Variance
SEARCH


Search Results - Microsoft Internet Explorer
Check the Include box to add an item to the assessment; uncheck the include box to remove an item
Item ID = Q0485
MEASURES OF SPREAD: DATA REPRESENTATION
REASONING
Last Modified March 1, 2004
Include
1. Draw a picture of two histograms (or smooth curves) that have the same shape and center, but where the first one has a larger standard deviation than the second one.
Item ID = Q0490
MEASURES OF SPREAD
LITERACY REASONING
Last Modified March 1, 2004
Include
2. Does the size of the standard deviation of a data set depend on where the center is?
a. Yes, the higher the mean, the higher the standard deviation
b. Yes, because you have to know the mean to calculate the standard deviation
c. No, because the standard deviation is only measuring how the values differ from each other.
d. No, the value of the standard deviation is not affected by the value of the mean
Item ID = Q0762
MEASURES OF SPREAD
REASONING
Last Modified March 1, 2004
Include
3. If two sets of data have exactly the same five-number summary then the two data sets must be identical. Do you agree or disagree? Explain your reasoning.
Item ID = Q0764
MEASURES OF SPREAD
LITERACY
Last Modified March 1, 2004
Include
4. Can a standard deviation be negative. Why or why not? Explain your answer.
Item ID = Q0939
MEASURES OF SPREAD
5. The midrange of a distribution is defined to be the average (mean) of the lower quartile and the upper quartile. The midrange of a distribution is defined to be the average


MANAGE ASSESSMENTS - Microsoft Internet Explorer
CREATE A NEW ASSESSMENT: Fill in the following information, then click the SUBMIT button.
Assessment Name (up to 30 characters. Do not include a forward slash, /, in the name.)
Course Number or Identifier
Course Name (up to 50 characters)
SUBMIT
CURRENT ASSESSMENTS
Your current assessments are listed at the bottom of this page.
Descriptions of the buttons available for each assessment are provided below.
TEST button - Click to display a list of the items included in an assessment.
SEARCH button - Displayed if there are no items in the assessment. Click to search for items to include in the assessment.
GET button - Click to download a file in Rich Text Format (.rtf) that can be opened in Microsoft Word.
RENAME button - Use to change the Assessment Name, Course Identifier, or Course Name for an assessment
change the information in the respective fields
then click the RENAME button.
CAUTION It is best to use only letters and numerals to name your files. Do not use symbols such as #, &, /, $, etc. Some of the symbols are interpreted as directory delimiters by different operating systems. So, you can name an assessment "Test 2" or even "Test_2", but avoid names such as "Test/2" or "Test#2", otherwise you are likely to receive an error message saying that the file cannot be found when you try to download the assessment.
DELETE button - Click to remove an assessment. This action CANNOT be undone.
VIEW
DOWN LOAD
UPDATE
Assessment Name
Course Identifier
Course Name
Items
DELETE
TEST
GET
RENAME
Try1
mth147
introductory statistics
11
DELETE
TEST
GET
RENAME
ax1
mth247
Applied Statistics
31
DELETE
TEST
GET
RENAME
slr
mth247
statistical inference
16
DELETE
TEST
GET
RENAME
aku1
stat101
introductory statistics
4
DELETE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NEW SEARCH
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RTF File Created
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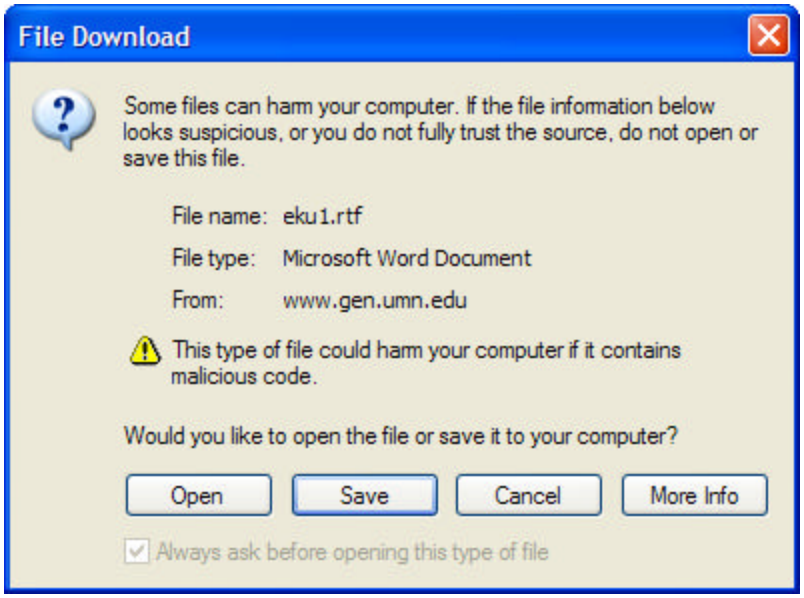
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eku1

1. Draw a picture of two histograms (or smooth curves) that have the same shape and center, but where the first one has a larger standard deviation than the second one.

2. Does the size of the standard deviation of a data set depend on where the center is?

   a. Yes, the higher the mean, the higher the standard deviation

   b. Yes, because you have to know the mean to calculate the standard deviation

   c. No, because the standard deviation is only measuring how the values differ from each other.

   d. No, the value of the standard deviation is not affected by the value of the mean

3. If two sets of data have exactly the same five-number summary then the two data sets must be identical. Do you agree or disagree? Explain your reasoning.

4. Can a standard deviation be negative. Why or why not? Explain your answer.