



Hand-size versus Height: a Real-time hands-on activity

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Web Site:
<http://stat.cst.cmich.edu/statact/>

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Outline of the Presentation

- What/Why using real-time online hands-on activities
- Demonstrate the Hand-size Vs. Height activity:
 - Issues related to data production
 - Bivariate relationship
 - Instructional materials
 - Assessment materials
- Benefits and Challenges
- First Time user



What is a real-time hands-on activity

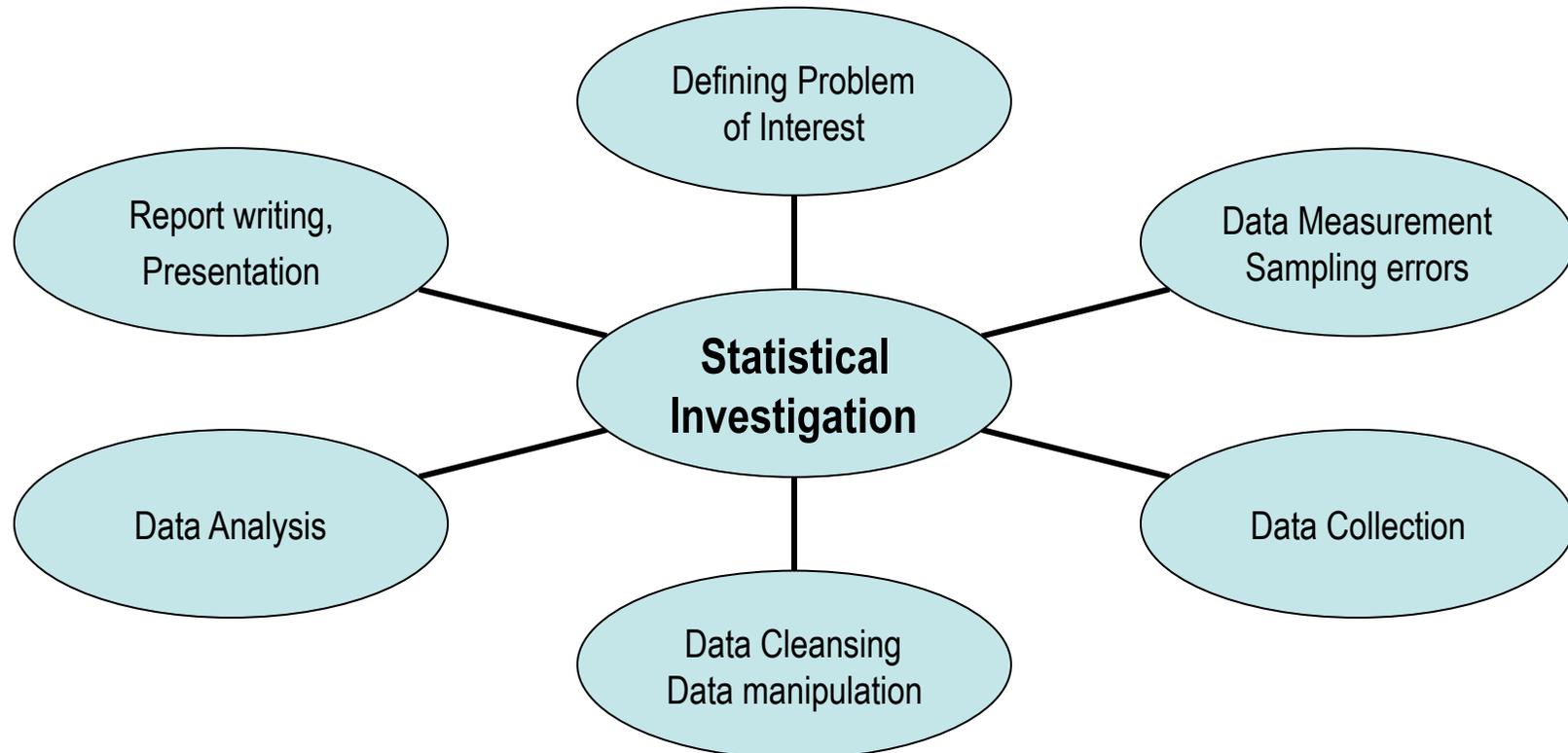
- It is a hands-on activity
- It collects students' own data
- Data are entered through Internet to the STATACT site at <http://stat.cst.cmich.edu/statact/>
- Data are accumulated in an online data base.
- Data are ready for downloading for instructional use immediately after entry.

[Navigation of the Real-time site](#)



Why Real-time data Generated by Students?

This makes it possible to conduct the entire process of statistical investigation in an introductory statistics course.





Activity: How well can hand-size predict height?

The learning goals: By the end of the activity, students are expected to be able to:

- Explain the importance of data measurement and production in a given context, and choose a measurement that is more robust to the environment.
- Apply graphical and numerical techniques to describe and interpret the relationship between two variables.
- Explain the least square method in a given context.
- Distinguish between causation and association.
- Apply residual plots to determine if linear model is appropriate.
- Identify outlying cases and determine their effects.



The context for using this activity

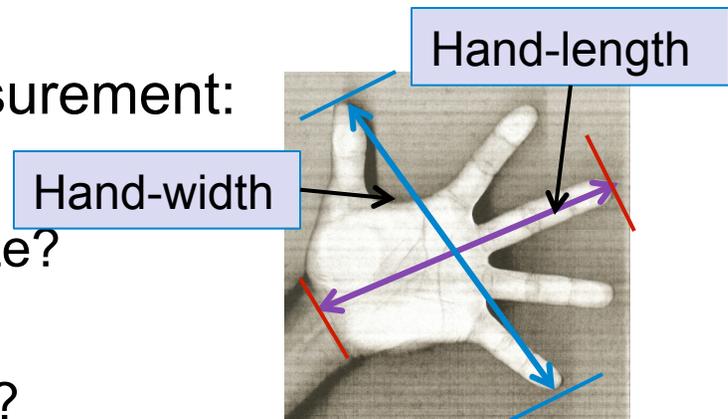
- The activity is appropriate for introductory statistics at high school or university.
- The activity can be used as a individual or group project.
- Time needed to conduct the activity is about ten minutes (including data measurement, entry and downloading) for the entire class.
- Prior to conduct the activity: The instructor needs to
 - register on the [Real-time online site](#) to request for the ACTIVITY CODE
 - Prepare one-foot long paper rulers or actual rulers.
 - Prepare a worksheet with assessment questions. You can download the [Activity-worksheet](#) and the data set ([hand-size data \(50cases\)](#)) used for this worksheet. You can modify this worksheet or create your own.



Teaching Notes to facilitate the activity

During the session of facilitating the activity:

- Start with proposing the problem to be investigated: How well can your hand size predict your height?
- Discuss the issues related to data measurement:
 - how to measure hand-size,
 - is the measurement measures hand-size?
 - Is the measure easy to measure?
 - how well can it be measured repeatedly?



NOTE: Two measures of the hand-size that students will collect are

Hand-length (from wrist to tip of middle finger) and

Hand-width (the tip of thumb to tip of little finger with the hand completely expended).

[GO TO STATACT site to demonstrate data entry and download](#)



WELCOME TO STATACT

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- Discuss the data quality issues such as
 - data measurement error: using centimeter vs. inch; Hand-width is shorter than hand-length (NOTE: If the measurements are properly measured, then Hand-width is always larger than hand-length)
 - Data entry error,
 - outliers
- Discuss the relation between Height and Hand-length by introducing
 - Scatter plot, correlation,
 - least square method, build simple linear regression,
 - Causation Vs. Association,
 - R^2 , Residual plots for model diagnosis,
 - ANOVA table, Confidence interval and testing hypothesis for slope.

MINITAB - Untitled

File Edit Data Calc Stat Graph Editor Tools Window Help

Session

4/27/2006 7:01:54 PM

Welcome to Minitab, press F1 for help.
Retrieving worksheet from file: 'C:\Documents and Settings\leelc.CENTRAL\Desktop\hand_size_100.dat'
Worksheet was saved on Thu Apr 27 2006

hand_size_100.dat ***

↓	C1-T	C2-T	C3	C4	C5	C6
	user_type	Gender	hand_length	hand_width	height	
73	student	male	8.500	8.500	72.0	
74	student	male	7.500	9.000	72.0	
75	student	male	8.000	9.500	69.5	
76	student	male	8.500	8.000	72.0	
77	student	male	7.500	9.500	67.2	
78	student	male	8.250	9.250	75.0	
79	student	female	7.000	4.000	66.0	
80	student	male	7.500	10.000	73.0	
81	student	male	8.000	5.000	72.0	
82	student	male	7.500	9.000	72.0	
83	student	male	8.250	9.750	74.0	
84	student	female	6.250	7.500	60.0	
85	student	male	7.500	8.000	*	
86	student	male	7.500	8.500	72.0	
87	student	female	7.000	8.000	63.5	

Current Worksheet: hand_size_100.dat

7:19 PM Thursday

In the second part of the Worksheet activity, students are asked to browse through the data and to see if there are 'unusual' data.

Some students may notice there are some missing cases, and some students may notice some very small hand_width. For this data, case 79 and case 81 are two 'unusual cases whose hand_width are 4" and 5", respectively.

Students are asked to discuss possible reasons.

These cases are then deleted, students are asked to reanalyze the data and compare the results with the first analysis. Students are the asked to discuss the impact of these 'unusual' cases.



Unique Opportunity for discussing issues related to data measurement and production

Data are accumulated. The data are messy. It provides an unique opportunity to address the issues related to data measurement and data production.

The following table summarizes the issues related to data production using the real-time activities:

Choice of measurement units	Distance, Hand_size, Exercise
Robustness of measuring techniques	Distance, Hand_size, Exercise
The operational definition of variable	Distance, Hand_size, Exercise
Subjective sampling or random sampling	Sampling, Vote, Random_selection, Raisins
Outliers Vs. errors	Distance, Hand_size, Exercise
Observational Vs. experimental study	Exercise, Vote, Colleg_life, Random_selection
Underline target population	Raisins, Vote, Distance



Instructional Materials for introducing bivariate relationship using Hand-size activity

- [A set of Power Point Slides for instruction](#)
- [The Hand-size data set used in the power point slides](#)

Assessment Materials for Bivariate Relationship

- [Activity Worksheet](#)
- [Hand-size data for the Activity Worksheet](#)
- [Activity Worksheet – using Online Applet](#)
- [Some additional questions for assessment](#)



Benefits that we have noticed

- Creates an environment for students to experience and practice the cycle of statistical investigation, from data measurement to presentation.
- Active learning is an immediate consequence.
- Students' own data motivates students better.
- Easy to assign projects.
- Allows instructors to share their activities data online.
- Allows different classes to use the same project in different semesters with different data sets.
- It is able to accomplish the recommendations by the GAISE Report.



Obstacles we Have Experienced

- It requires computer lab and Internet access, if you would like to have your students to conduct the activities.
- Some students do not have adequate computer background. Some additional preparation about the computer basics may be needed.
- Students learned their mathematics by lecture with step-by-step procedures. Having students to be active learners encounters resistance in some cases.



Suggestions to First Time Users

- (A) Start with one activity that you feel most comfortable and you think students will have the most benefits.
Two most popular activities are Hand-size activity and Raisins Activity.
- (B) Take the opportunity to discuss data measurements and data quality.
- (C) Engage students whenever possible. Students are eager to participate, if given opportunity.
- (D) Use the technology that you are most familiar with and easy for students to learn.
- (E) Plan ahead. Get familiar with the data entry, data download and how to use your local technology to read the .dat data.
- (F) Keep students informed on what you plan to do and how the activity will be assessed.

If you need any help, please let me know. Simply e-mail me, or call me.



References

- The Real-time online Hands-on Activity web site:
<http://stat.cst.cmich.edu/statact/>
- [Online Applet for demonstrating bivariate relationship](#)
- [SERC Pedagogy Service Project on CAUSE web site](#)

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Just In case, if technology does not work. The following slides are screen shots to demonstrate the process of using the Real-time activities



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Welcome to the Statistics Action Home Page: Real-Time Online Activities for Statistics

Real Time Online Hands-on Activities

An online database that hosts the data collected from in-class hands-on activities conducted by students.

If your answer to any of the following questions is "YES", then, this Real-Time Online Database should be beneficial to your class.

- Do you use hands-on activities in your class?
- Would you like to share your hands-on activities?
- Would you be interested in using data collected by students from classes in different institutions?
- Would you be interested in sharing your students' data with others?

This Real-Time Online Database is the result from a NSF/CCLI project under the grant #0310932. The goal of the project is to adapt, implement and evaluate an **Activity-Based, Cooperative learning and Technology (ACT)** curriculum in statistics courses for non-majors and prospective K-12 teachers. The guiding principles are:

- People learn better by constructing knowledge themselves through guided processes.
- Practice and feedback are essential ingredients for understanding new concepts.
- Active problem-solving through teamwork promotes active learning.





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Real Time Online Hands-on Activities

General Directions for Participation

You are about to participate in a real-time online hands-on activity. There are two ways to participate in the activity:

I. Participate in Collecting Data for the online hands-on activity:

- (A) For Instructors:
For each activity, **an activity pass code is required.** To obtain the Pass Codes, please [Register](#) to submit your request. You will receive a list of activity pass codes by e-mail in a few minutes. The [Instruction for facilitation](#) page provides general guidelines for facilitating the online activities. Once you have the activity pass codes, you are ready to facilitate the real-time online activity.

Click on [Data Entry](#) to begin.

- (B) For Students:
Please click on [Instruction for participation](#) to read the Guidelines for Participation. After reading the guidelines, return to this page then wait for directions from your instructor.

II. Use the data available on the database for class activities or homework activities. **NO PASS CODE is needed.** You can go directly to the [Data Download](#) page to download the data.



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Real Time Online Hands-on Activities

Registration Form for Online Hands-on Activities

I have approximately students in my class.***

40+5 is the maximum # of data entries for each activity.

Name *	Carl Lee
Email *	carl.lee@cmich.edu
Email (re-enter for validation) *	carl.lee@cmich.edu
Affiliation *	Central Michigan Univ
Phone (work) *	(989)774-3555
Street/Road *	PE109
City, State , Zip Code *	Mt. Pleasant MI 48859

I want to register for the following activities: **

NOTE: The Activity: College_Life is currently not available. Please do not use this activity. Sorry about the inconvenience.

<input checked="" type="checkbox"/>	Distance: How far are you away from home?
<input checked="" type="checkbox"/>	Hand_Size: Is hand size a good predictor of height?
<input checked="" type="checkbox"/>	Exercise: How does one minute of exercise affect your pulse rate?
<input checked="" type="checkbox"/>	Raisins: How many raisins in a 1/2 oz box?
<input type="checkbox"/>	College_Life: Are you satisfied with your university?
<input checked="" type="checkbox"/>	Left_Right_Hand: Are you left handed or right handed?
<input checked="" type="checkbox"/>	Sampling: Random sampling v. subjective sampling. Which is better?
<input checked="" type="checkbox"/>	Notes: Which party will you vote for?





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Online Activity

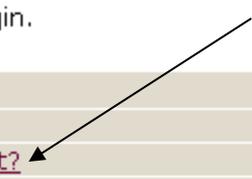
Data Entry

For Instructor: A pass code is needed for data collection for each online activity. Please [register](#) for the pass codes.

For students: For the activity you are about to participate, a pass code will be provided by your instructor. **Students DO NOT register for pass codes.**

Select the activity your class is participating in to begin.

Activity	Title
Distance	How far are you away from home?
Hand_Size	Is hand size a good predictor of height?
Exercise	How does one minute of exercise affect your pulse rate?
Raisins	How many raisins are in a 1/2 oz box?
College_Life	Are you satisfied with your university?
Left_Right_Hand	Are you left handed or right handed?
Sampling	Random sampling vs. subjective sampling. Which is better?
Vote	Which party will you vote for?
Draw_Line	Can you draw a straight line without a ruler?
Random Selection	Which numbers are popular?





Conduct the Hand Size Activity

Purpose of the Activity:

1. Introduce the importance of measurement.
2. Introduce correlation, scatter plots.
3. Introduce the difference between causation and association.
4. Introduce the Least Square method and simple linear regression.
5. Introduce outliers and the effect of outlier in Y and influential cases in X.

In-class discussions:

- Discuss the issues of measurement.
- Is Hand Length a better measure or Hand Width? Why?
- Which one, Hand Length or Hand Width, is expected to have larger variation?

Distribute the worksheet, a paper rule. Work through some of the questions in class. Leave others as homework.

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Activity Hand_Size

Is Hand Size a Good Predictor of Height?

For Instructors: Do you have the pass code for this activity?

For Students: Have you read the [Instruction for Participation](#) page?

[Add Data](#)

[Select Data](#)

[Analyze Data](#)

The Problem

Is hand size a good predictor of height? You are about to collect your own data to find out if hand size and height are correlated and if we can make a good prediction of height using hand size. However, we first need to decide how to measure hand size.

Objectives

1. Learn the importance of proper measurement.
2. Learn the construction of scatter plots and correlations.
3. Learn the concept of relationships between two variables.
4. Learn the least squares method.
5. Learn the concept of model fitting and prediction.
6. Learn how to interpret a regression model.

Key Concepts

Scatter plots, correlation, least square method, simple linear regression, slope and residuals.

Other Related Topics

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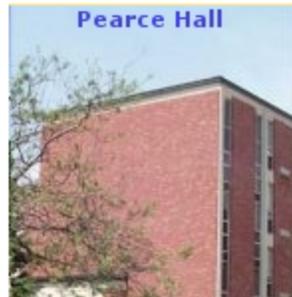
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Activity Hand_Size: Is Hand Size a Good Predictor of Height?

Please take your time and participate in this activity.

How to measure hand size: A discussion should be conducted to brainstorm different ways to measure hand size along with pros and cons for these different measurement methods.

In the following data entry table, we will measure hand size by measuring:

Hand-length: wrist to the top of the middle finger, and

Hand-width: from the tip of the thumb to the tip of the pinky when you expand your hand as much as you can (this is for consistency).



There are two choices: Instructor, Student. This allows the instructor to practice. The instructor's data will also be recorded.

All fields must be filled. Double check that the data is correct before submission.

From the registration. Provided by the instructor.

I am a/an

Select One

Activity Code

ACT1145808372

Gender

Select One

Hand-length (wrist to top of middle finger)*

inches

Hand-width (tip of thumb to tip of little finger)

*Note: Hand has to be stretched out, meaning the fingers should be spread as much as possible.

inches

Your height * (XX.X)

inches

Add data

Reset

*These fields must be filled.





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Variable Descriptions

Activity Hand_Size: Is hand size a good predictor of height?

Following is a descriptive table of all of the input expected by the user. This table can be used to match the Variable Labels, as seen as the previous page, with the Variable Names, which will be the column headings in the data download.

Download this table in [Word \(.doc\) format](#) or Adobe .pdf format.

Variable Name	Variable Label	Possible Values	Data Type
user_type	User type	Student, Instructor	text
Gender	Gender	Male, Female	text
Hand_Length	Hand-length (wrist to top of middle finger)	user entry	numerical
Hand_Width	Hand-width (thumb to little finger)	user entry	numerical
Height	Your height in inches (XXX)	user entry	numerical

Download this table in [Word \(.doc\) format](#) or Adobe .pdf format.





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Data Analysis

By this time, you should have a data set downloaded and ready for analysis. You may use the software in your local computer lab. Please follow the instructor's directions.

In the following, we provide some instructional materials for MINITAB and SPSS:

- [Minitab instructions](#)
- [SPSS instructions](#)

For more rigorous training on SPSS, go to the site:

- [Online SPSS Training Workshop](#)

If you do not have commercial statistical software, there is an online statistical analysis tool available: go to the site:

- [Statcrunch Online Data Analysis Tools](#)

The following Power Point Slides take you step by step about

- How to download and save data.
- How to read the data using
 - Minitab
 - Excel
 - SPSS
 - Statcrunch

[Instruction on How to Download, Save and Read Data](#)



start

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http://stat.cst.cmic...

Microsoft PowerPoin...



Internet
3:17 PM
Sunday

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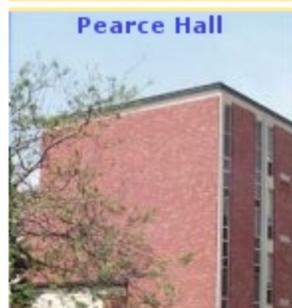
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Data Download

For Instructor: If your class only wants to use the data collected by other classes, you do not need to register for pass codes.

Select the activity your class is participating to download the data.

Activity	Title
Distance	How far are you away from home?
Hand_Size	Is hand size a good predictor of height?
Exercise	How does one minute of exercise affect your pulse rate?
Raisins	How many raisins are in a 1/2 oz box?
College_Life	Are you satisfied with your university?
Left_Right_Hand	Are you left handed or right handed?
Sampling	Random sampling vs. subjective sampling. Which is better?
Vote	Which party will you vote for?
Draw_Line	Can you draw a straight line without a ruler?
Random Selection	Which numbers are popular?

There are two options you have to analyze the above data sets:

- Use the software in your local computer lab.
- Use the online software, namely Crunch_It at: <http://www.statcrunch.com/>

The following Power Point Slides take you step by step about

- How to download and save data.
- How to read the data using
 - Minitab
 - Excel
 - SPSS
 - Statcrunch

[Instruction on How to Download, Save and Read Data](#)





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Data Download

Activity Hand_size: Is hand size a good predictor of height?

[View the Last 10 Submissions](#)

Select your data based on the instructions given by the instructor.

- Select all cases.
- Select students only.
- Select all data from my class. (Enter activity code)

ACTXXXXXXXXXX

- Select most recent cases.
- Select random cases.

Download Data Reset

Please save the data before you open it. The default file name is "mydata.dat". The first record is the variable name. Data values are tab delimited.

- * If you leave any fields blank by default all data will be selected.
- ** If you leave this unchanged by default all data or miles 0 to 15000 will be selected.

I use this most often.

Use this for projects. So that every group will have different data sets.



start

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Statistics Alive at C...

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Activity Registration...



4:56 PM Thursday



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Data Download

File Download

Do you want to save this file?

Name: mydata.dat
Type: Unknown File Type, 557 bytes
From: stat.cst.cmich.edu

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not save this file. [What's the risk?](#)

Select variable: Select all variables. Select variables with missing values. Select variables with no missing values.

- Select most recent cases.
- Select random cases.

Please save the data before you open it. The default file name is "mydata.dat". The first record is the variable name. Data values are tab delimited.

* If you leave any fields blank by default all data will be selected.
** If you leave this unchanged by default all data or miles 0 to 15000 will be selected.



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Real Time Online Hands-on

File Download



Saving: mydata.dat from stat.cst

Estimated time left: []

Download to: []

Transfer rate: []

Close this dialog box

Select your []

Select [] most

Select [] random cases.

Save As

Save in: Desktop

- My Recent Documents
- Desktop
- My Documents
- My Computer
- My Network

- My Documents
- My Computer
- My Network Places
- Aaron's temp
- ASSESSMENT_S_2005
- Laura
- Marcia-2005
- Self-tests
- STA 596A
- Statact ROBODEMO Documentation
- Teresa
- distance_150
- distance-cmu
- sampling

File name: hand_size_100

Save as type: .dat Document

Please save the data before you open it. The default file name is "mydata.dat". The first record is the variable name. Data values are tab delimited.

* If you leave any fields blank by default all data will be selected.
** If you leave this unchanged by default all data or miles 0 to 15000 will be selected.



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Data Download

Select your...

ACTX

Select 100 most recent cases.

Select random cases.

Please save the data before you open it. The default file name is "mydata.dat". The first record is the variable name. Data values are tab delimited.

* If you leave any fields blank by default all data will be selected.
 ** If you leave this unchanged by default all data or miles 0 to 15000 will be selected.

Download complete

Download Complete

Saved: mydata.dat from stat.cst.cmich.edu

Downloaded: 2.53 KB in 1 sec

Download to: C:\Documents an...hand_size_100.dat

Transfer rate: 2.53 KB/Sec

Close this dialog box when download completes

Always choose 'Close'. Then, direct students to run a software, such as MINITAB, and open the file using the software.

The .dat file is a text file using tab as the delimiter.



4/27/2006 7:01:54 PM
Welcome to Minitab, press F1 for help

Open Worksheet

Look in: Desktop

- My Documents
- My Computer
- My Network Places
- Aaron's temp
- ASSESSMENT_S_2005
- Laura
- Marcia-2005
- Self-tests
- STA 596A
- Statact ROBODEMO Documentation
- Teresa
- distance_150
- distance-cmu
- hand_size_100
- sampling

File name: hand_size_100

Files of type: Data (*.dat)

- Minitab (*.mtw; *.mpj)
- Minitab Portable (*.mtp)
- Excel (*.xls)
- Quattro Pro (*.wb1; *.wq1)
- 1-2-3 (*.wk?)
- dBase (*.dbf)
- Text (*.txt)
- Data (*.dat)
- All (*.*)

Open Cancel Help Merge Open

Make sure you go to the location where you save the data.

Make sure you choose the file type .dat, select the file: hand_size_100, then, open.

Worksheet 1 ***

	C1	C2	C3
1			
2			
3			
4			
5			
6			
7			
8			
9			

C16

The screenshot shows the Minitab software interface. At the top is the menu bar (File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help) and a toolbar with various icons. Below the menu bar is the 'Session' window, which contains the following text:

```

Welcome to Minitab, press F1 for help.
Retrieving worksheet from file: 'C:\Documents and
Settings\leelc.CENTRAL\Desktop\hand_size_100.dat'
Worksheet was saved on Thu Apr 27 2006

```

Below the Session window is the data worksheet titled 'hand_size_100.dat ***'. The worksheet contains the following data:

↓	C1-T user_type	C2-T Gender	C3 hand_length	C4 hand_width	C5 height
1	student	female	6.500	8.000	60.3
2	student	male	7.400	9.000	70.0
3	student	male	7.600	7.900	60.0
4	student	female	8.000	6.500	60.3
5	student	female	6.500	7.500	65.0
6	student	male	7.500	7.500	74.4
7	student	female	8.000	6.875	63.0
8	student	female	7.000	8.000	66.5
9	student	male	8.500	9.400	75.0
10	student	male	7.000	8.000	68.0
11	student	female	7.000	7.000	65.5
12	student	male	9.000	8.000	70.0
13	student	male	8.000	9.000	69.0
14	student	female	6.500	8.500	61.0
15	student	male	7.500	8.500	72.0

Overlaid on the right side of the worksheet is a text box with the following text:

This is the data downloaded.

In the first part of the activity, students are asked

- to create scatter plots, obtain correlations, and fit models between (Hand_length and Height), and between (Hand_width and Height).
- To make a comparison to see which variable is a better predictor of height, and discuss some reasons behind their observation.

At the bottom of the screen, the Windows taskbar is visible, showing the Start button, several open applications (Inbox - Microsoft O..., Microsoft PowerPo..., http://stat.cst.cmic...), and the Minitab - Untitled window. The system clock shows 7:24 PM on Thursday.

MINITAB - Untitled

File Edit Data Calc Stat Graph Editor Tools Window Help

Session

4/27/2006 7:01:54 PM

Welcome to Minitab, press F1 for help.
Retrieving worksheet from file: 'C:\Documents and Settings\leelc.CENTRAL\Desktop\hand_size_100.dat'
Worksheet was saved on Thu Apr 27 2006

hand_size_100.dat ***

↓	C1-T	C2-T	C3	C4	C5	C6
	user_type	Gender	hand_length	hand_width	height	
73	student	male	8.500	8.500	72.0	
74	student	male	7.500	9.000	72.0	
75	student	male	8.000	9.500	69.5	
76	student	male	8.500	8.000	72.0	
77	student	male	7.500	9.500	67.2	
78	student	male	8.250	9.250	75.0	
79	student	female	7.000	4.000	66.0	
80	student	male	7.500	10.000	73.0	
81	student	male	8.000	5.000	72.0	
82	student	male	7.500	9.000	72.0	
83	student	male	8.250	9.750	74.0	
84	student	female	6.250	7.500	60.0	
85	student	male	7.500	8.000	*	
86	student	male	7.500	8.500	72.0	
87	student	female	7.000	8.000	63.5	

Current Worksheet: hand_size_100.dat

7:19 PM Thursday

In the second part of the activity, students are asked to browse through the data and to see if there are 'unusual' data.

Some students may notice there are some missing cases, and some students may notice some very small hand_width. For this data, case 79 and case 81 are two 'unusual cases whose hand_width are 4" and 5"', respectively.

Students are asked to discuss possible reasons.

These cases are then deleted, students are asked to reanalyze the data and compare the results with the first analysis. Students are the asked to discuss the impact of these 'unusual' cases.



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Real Time Online Hands-on Activities

Assessment

The assessment materials are classified based three categories

[Based on Activities](#)

[Based on Topics](#)

[Based on Projects](#)

When analyzing data, one can use any technology that is available for the class. In the following, we provide some instructional materials for MINITAB and SPSS:

- [Minitab instructions](#)
- [SPSS instructions](#)

For more rigorous training on SPSS, go to the site:

- [Online SPSS Training Workshop](#)

If you do not have commercial statistical software, there is an online statistical analysis tool available: go to the site:

- [Statcrunch Online Data Analysis Tools](#)

In addition, ARTIST (Assessment Resource Tools for Improving Statistical Thinking) site consists of very extensive list of student learning outcomes assessment tools. Go to the ARTIST site:

- [ARTIST \(Assessment Resource Tools for Improving Statistical Thinking\)](#)

ARTIST provides tests and measurement tools to use in research studies and evaluation





Real Time Online Hands-on Activities



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Assessment Based on Activities

Activity	Assessment
Distance	How far are you away from home?
Hand_Size	Is hand size a good predictor of height?
Exercise	How does one minute of exercise affect your pulse rate?
Raisins	How many raisins are in a 1/2 oz box?
College_Life	Are you satisfied with your university?
Left_Right_Hand	Are you left handed or right handed?
Sampling	Random sampling vs. subjective sampling. Which is better?
Vote	Which party will you vote for?
Draw_Line	Can you draw a straight line without a ruler?

In addition, ARTIST (Assessment Resource Tools for Improving Statistical Thinking) site consists of very extensive list of student learning outcomes assessment tools. Go to the ARTIST site:

- [ARTIST \(Assessment Resource Tools for Improving Statistical Thinking\)](#)

ARTIST provides tests and measurement tools to use in research studies and evaluation projects as well as additional information, like a Q&A section, that may be useful.



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Real Time Online Hands-on Activities

Assessment Based on Topics

note some assessments are covered in more than one topic

Topics:

- [Graphical Display](#)
- [Descriptive Statistics](#)
- [Sampling \(Random Vs. Subjective\)](#)
- [Correlation and Regression](#)
- [Probability Concepts](#)
- [Distribution \(discrete, Binomial\)](#)
- [Normal Curve](#)
- [Sampling Distribution of Sample Mean](#)
- [Confidence Intervals and Hypothesis testing](#)

In addition, ARTIST (Assessment Resource Tools for Improving Statistical Thinking) site consists of very extensive list of student learning outcomes assessment tools. Go to the ARTIST site:

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ARTIST provides tests and measurement tools to use in research studies and evaluation projects as well as additional information, like a Q&A section, that may be useful.



start

Microsoft PowerPoin...

http://stat.cst.cmic...

141.209.171.23 - R...



Internet
12:06 PM
Sunday

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Suggested Questions for Homework or Projects

Activity Hand_size: Is hand size a good predictor or height?

Questions for Key Concepts:

1. The following statement is statistically incorrect. Explain what is wrong. Student ratings of professors' teaching and colleagues' ratings of their research have a correlation of $r=1.21$. This shows that those professors who are good teachers are also good researchers.
2. Is there evidence that a relationship exists between moderate wine consumption (X) and number of deaths due to heart disease (Y) for developed countries? Data collected on 19 developed nations is summarized. Use this information to answer the remaining questions.

X = wine consumption (avg. # liters wine per person per year)

Mean = 3.03

Standard Deviation (SD) = 2.51

Y = number of heart attack deaths per 100,000 people/year

Mean = 191.05

SD = 68.40

Correlation = -0.843

(a) Interpret the value of the correlation in this setting.

(b) Assume a scatterplot shows a linear relationship. What other evidence do you have to suggest that it is ok to go ahead and fit a line to this data?

(c) Explain how you would verify, by calculation, that the slope of the best-fitting line for this situation is -22.97.

