

JMP INTRO® Lab Activities

Lab Activity – Describing Numerical Data Graphically

Data Set: Big Class

In this lab you will be introduced to a computer program called JMP INTRO, a statistics program that will help us do statistics. In most cases you'll use an existing file of data, do some analysis with JMP INTRO, and create a word processing document for your report. In this report you'll have numerical summaries and graphs from JMP INTRO, along with your commentary and interpretation.

Start your computer and open JMP INTRO. On the **JMP Starter** menu, click **Open Data Table**. Open the data file named **Big Class** from the Sample Data folder. When you open the file, you should see data for 40 students, presented in a spreadsheet-like format. This data represents students who are all enrolled in a martial arts class. Their teacher has to buy new uniforms for an upcoming competition and has taken measurements to help her. For each student, four variables are shown: age, sex, height, and weight.



Click the blue triangle in the upper left-hand corner of the data window. This will open the Data Table Panel to the left of the Data Grid that will provide additional information on the variables and easy access to menu options.

Open **Analyze** on the menu bar and select **Distribution**. This opens a dialogue box that gives you the opportunity to specify which variables to analyze. Select **height** for the **Y,Columns** variable. Then click **OK**.

The display should show a histogram (possibly with a vertical axis), a kind of boxplot, and some numerical summaries. View the histogram horizontally. If you need to change the histogram to a horizontal layout, click the red triangle next to the heading **height**. From the pop-up menu, select **Display Options** **Horizontal Layout**.

Using the **height** red triangle menu again:


- create a stem and leaf plot for the heights,
- modify the histogram to include both a count axis and probability (prob) axis - use **Histogram Options**.

One important feature of JMP INTRO is its interactive nature. Here are some examples for you to try (in general, you can undo a mistake you make in the data table by using the **Edit** ® **Undo** command):

- Arrange your window so that both the **Big Class** data table and **Distributions** windows are visible. (This can be accomplished by resizing the windows or by tiling the windows.)
- Click on a row of the data table, then look at the histogram: its location is highlighted.
- Look at the stem and leaf plot: this same value highlighted on the histogram is shown in bold type.
- Select all the 12-year-olds from the data table. (They are concentrated in the shorter heights in the histogram and stem and leaf plot.) To select the 12-year olds, activate the **Rows** menu. You can do this from the menu bar or by clicking the red triangle to the left of rows in the Data Table Panel. Then choose **Row Selection** ® **Select Where . . .**. In the pop-up menu, highlight the variable **age**. Make sure **equals** is chosen in the box below the variable selection, and enter **12** in the box to the right of this. Click **OK**. (To deselect rows and columns, click in the triangular space in the upper-left corner of the data grid.)



- Click on a bar of the histogram: the corresponding rows of the data table are selected and stem and leaf plot values are bold.
- Point at one of the outliers that represents an individual point in the boxplot: the name of this student should appear as the pointer moves over the dot, because **name** has been assigned the role of label, indicated in the Data Table Panel, to the left of the data table, by the yellow tag icon. Add **age** to the label. (Hint: select the age column, then use **Label/Unlabel** in the **Cols** or **Columns** menu. A little yellow icon will appear next to the newly labeled variable in the Data Table Panel.)
- If you have both **name** and **age** as labels, determine what happens when the pointer moves over one of the outliers. Click on the outlier point: note that the row in the table is highlighted, as is its location in the histogram and stem and leaf plot

Open your word processor. Once you have the display in JMP INTRO as you want it, graphics and text reports from the JMP INTRO display can be inserted into the word processing document. Choose the **Selection** icon ( or dashed rectangle on the Macintosh) in the **Tools** toolbar, and use this to highlight items to be copied. These items can be inserted into your word processing document by either copying and pasting or using the “drag and drop” method.

Your report should include:

- A histogram for height that includes a 'Count Axis'.
- A boxplot for height that appears by itself with a scale.
- A stem and leaf plot for height.
- A five-number summary (minimum – lower quartile – median – upper quartile – maximum) for height from the **Quantiles** display. Note that JMP INTRO gives you additional quantiles. In the word processor, edit this down to just the five numbers.
- A table from the **Moments** text box that includes the mean, standard deviation, and number of students. Again, you'll need to edit the table from JMP INTRO in your word processing program so that the extraneous numbers are removed.
- A description of the shape of the distribution of heights. Refer to specific aspects of the graphs and numerical displays to support your answer. Write a brief description of the heights of students from **Big Class**.

Print a copy of your lab report. Proofread your copy, make any needed changes, close JMP INTRO and the word processing program, and log off.

JMP INTRO® Lab Activities

Teacher Notes

Lab Activity – Describing Numerical Data Graphically

Objectives:

- Gain familiarity with some of the basic operational tools of JMP INTRO.
- Use JMP INTRO to display a histogram, boxplot, stem and leaf plot, and summary statistics.
- Create a word processing document, incorporating graphs and tables from JMP INTRO.

Time Required: 45 minutes

Materials:

- Describing Numerical Data Graphically student activity directions
- Big Class data set

Prerequisites:

- Students should have experience producing numerical summaries and graphical displays by hand and/or with graphing calculators.
- Students should have basic knowledge of how to use a word processing program.
- Students should be familiar with the school's login procedure.
- Students should have knowledge of opening, closing, and saving files.

JMPINTRO Notes:

- The JMP INTRO disk can be used to install JMP INTRO on either a Windows machine or a Macintosh. The two versions are almost identical in their commands.
- The **Big Class** data file is included in the Sample Data folder as part of JMP INTRO.
- JMP INTRO includes an extensive online help system. It contains a table of contents and/or can be used to search for a specific topic. In addition, JMP INTRO has context sensitive help. You can access it by selecting the help tool (?) from the tools toolbar and clicking inside a data table or display. JMP INTRO opens help specific to the clicked-on item.
- In general, you can undo a mistake by using the **Edit® Undo** command.
- Blue triangles are Disclosure icons that reveal (or hide) additional information.
- Red triangles reveal popup menus.
- There are two ways to arrange windows. You can shrink or expand the window by selecting the resize button, which is the middle button in the upper right-hand corner of the window. If you still need a smaller window, move the cursor to the lower right-hand corner, and when the cursor changes to a double-sided arrow,

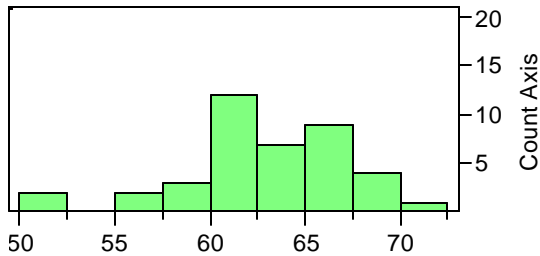
drag the window to the desired size. Alternately, you can tile the windows by using the **Window® Arrange® Tile Vertically** option in JMP INTRO.

- To select data in the data table, click on the first item and drag to the final item to select contiguous items. Alternately, you can click on the first item, hold down the shift button, and click on the final item. Either method automatically converts to the Selection tool while in the data table. CONTROL click (COMMAND-click on the Macintosh) to select discontinuous rows or columns. To select items from the Distribution window, use the appropriate Selection icon and the same selection methods.
- Other Macintosh equivalent key commands are:
 - Ctrl** = right-click
 - Option** = **Alt**
- To edit column names, double-click on them.
- To change the title of a window in JMP INTRO, select the window and use **Window® Set Title**.
- The **Moments** table displays the mean, standard deviation, standard error of the mean, upper and lower 95% confidence limits for the mean, and data set size.

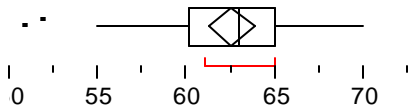
JMP INTRO® Lab Activities Answer Key

The following are suggested answers for Describing Numerical Data Graphically:

Histogram with a count axis



Boxplot with scale



Stem and leaf plot

Stem	Leaf	Count
7	0	1
6	8889	4
6	6667	4
6	444455555	9
6	22222333	8
6	0001111	7
5	899	3
5	6	1
5	5	1
5	2	1
5	1	1

5-Number summary

100.0%	maximum	70.000
75.0%	quartile	65.000
50.0%	median	63.000
25.0%	quartile	60.250
0.0%	minimum	51.000

Numerical statistics

Mean	62.55
Std Dev	4.2423385
N	40

Students' descriptions should include: the shape has a slight skewness to the left or fairly symmetric and includes two low outliers. Students report should include numerical references to support their statements about shape. For example if the student states the shape is skewed then the numerical reference should include the mean is less than the median. If the shape is described as fairly symmetric then the mean and the median are approximately equal. The student may also make reference to the values of the outliers. These students are both twelve years old. We would expect the shortest students in the class to be the youngest.