

## Guide to Using JMP in Statistics 104

This instruction sheet gives you some of the basic commands and instructions for analyzing data in Statistics 104 using JMP. JMP is available in lab rooms across campus; including rooms maintained by the Department of Statistics, 1105 Snedecor Hall, 3121 Snedecor Hall and 205 Carver Hall. The hours for both Snedecor Hall and 205 Carver Hall are 8am – 5pm Monday through Friday except when the lab is being used for classes. A list of labs on campus is available at [www.it.iastate.edu/labsdb/](http://www.it.iastate.edu/labsdb/) . If your favorite lab on campus does not have JMP, please ask them to install it.

Iowa State University has a university site-wide license for JMP on campus. All faculty, staff, and students may download JMP to their personal computers for free. Please refer to the help file *Installing JMP on Your Personal Computer* available on the Stat 104 main course webpage at <http://streaming.stat.iastate.edu/~stat104/homepage.html>.

Below are directions for performing different tasks in JMP. Please note: The instructions below assume you are using the current version of Internet Explorer and the current version of JMP (JMP 8.0.1). They might not work otherwise.

1. Downloading a JMP Data Set or JMP Script from the main course webpage.

Several homework assignments throughout the semester will require you to use JMP to analyze a data set or to run something called a JMP Script. These files are available on the course webpage. To download a file, go to the main course webpage for Stat 101. Under the **Data Sets and Scripts** heading, click on the appropriate link for the data set or script. Internet Explorer will prompt you to either **Save** or **Open** the file. Click **Open** to open the file in JMP. If this does not work, **Save** the file to your desktop, start JMP and **Open** the file in JMP.

2. Running a JMP Script.

After you have downloaded a JMP Script from the course webpage, you will need to run the script. In JMP, with the Script window active, click on **Edit – Run Script**.

3. Entering a Data Set into JMP.

For the course project and possibly other assignments, you will need to enter your data into JMP rather than downloading the data from the web. To enter your data, start JMP and click **File – New – Data Table**. To enter the first variable, right-click on the cell in the table named **Column 1**. Select **Column Info** and enter a name for the variable in the **Column Name** box. For a Quantitative Variable, select **Data Type: Numeric, Modeling Type: Continuous** and click **OK**. For a Categorical Variable, select **Data Type: Character, Modeling Type: Nominal** and click **OK**. You can now enter your values in the table cells. Check when you finish that you have the same number of rows in your table as you have values for

your variable. To enter additional variables, right-click on the open space next to the last column in the data table and select **New Column**. Follow the directions above to enter a name, data type and modeling type for the variable. Repeat this process until you have entered all variables in your data set.

#### 4. Obtaining Descriptive Statistics for a Single Categorical Variable.

To obtain descriptive statistics for a single categorical variable, select **Analyze – Distribution** from the JMP menu. Under **Select Columns**, click on the variable name you would like to analyze then click on the **Y, Columns** button. When you are finished, click **OK**.

JMP produces a bar graph and a table of relative frequencies or proportions for the categorical variable. Menu options are located in the red triangle next to the variable name. To change the bar graph to a horizontal layout, click the red triangle and select **Display Options – Horizontal Layout**. To add a vertical axis with counts to the bar graph, click the red triangle and select **Histogram Options – Count Axis**. To obtain a segmented bar graph, click the red triangle and select **Mosaic Plot**.

#### 5. Obtaining Descriptive Statistics and Conducting Inference for a Single Quantitative Variable.

To obtain descriptive statistics for a single quantitative variable, select **Analyze – Distribution** from the JMP menu. Under **Select Columns**, click on the variable name you would like to analyze then click on the **Y, Columns** button. When you are finished, click **OK**.

JMP produces a histogram, a box plot, a table of summary statistics based on Quantiles (which includes the Five Number Summary), and a table of summary statistics based on Moments (which includes the Mean and Standard Deviation). Menu options are located in the red triangle next to the variable name. To change the histogram to a horizontal layout, click **Display Options – Horizontal Layout**. To add a vertical axis with counts to the histogram, click the red triangle and select **Histogram Options – Count Axis**. To add a stem and leaf display, click the red triangle and select **Stem and Leaf**. To add a Normal Quantile Plot, click the red triangle and select **Normal Quantile Plot**.

If appropriate given your variable and data collection method, you may use JMP to calculate a confidence interval for the population mean, or to conduct a hypothesis test for the population mean. To obtain a confidence interval, click the red triangle and select **Confidence Interval**. Specify the confidence level (0.95 = 95% is the default value) and click **OK**. To conduct a hypothesis test, click the red triangle and select **Test Mean**. In the box **Specify Hypothesized Mean**, enter the value of the mean under the null hypothesis. Then click **OK**.

6. Obtaining Descriptive Statistics and Conducting Inference for the Relationship Between Two Categorical Variables.

To look at the relationship between two categorical variables, select **Analyze - Fit Y by X** from the JMP menu. Select the categorical response variable and click the **Y, Response** button. Select the categorical explanatory variable and click the **X, Factor** button. If you have a column of **Counts** select this and click on **Freq.** Then click **OK**.

A window will appear in JMP with a Mosaic Plot and a Contingency Table. The red triangle next to the word **Contingency Table** includes options for including in the table different values for each table cell: **Count, Total %, Col %, Row %**.

If appropriate given your variables and data collection method, you can use JMP to obtain the statistical inference related to the relationship between two categorical variables. The red triangle next to the word **Contingency Table** includes additional options related to inference, including: **Expected, Deviation, Cell Chi Square**. The inference information is located in the row labeled **Pearson** under the contingency table.

7. Obtaining Descriptive Statistics and Conducting Inference for the Relationship Between a Quantitative Variable and a Categorical Variable.

To look at the differences in the distribution of a quantitative variable between two or more groups (given by a categorical variable), choose **Analyze - Distribution** from the JMP menu. Under **Select Columns**, click on the quantitative variable then click on the **Y, Columns** button. Under **Select Columns**, click on the categorical variable name then click on the **By** button. When you are finished, click **OK**.

Click on the red triangle at the top of the window next to the words **Distribution . . .** and select both **Stack** and **Uniform Scaling**. For each group, click on the red triangle next to the words **Distribution . . .** and select **Uniform Scaling**. You can now compare histograms, box plot, stem and leaf displays, normal quantile plots, etc. by following the directions in number 5 above. The summary statistics for the quantitative variable for each group from the categorical variable are given in the tables.

If appropriate given your variables and data collection method, you may use JMP to conduct inference for the difference between the two population mean values. Select **Analyze - Fit Y by X** from the JMP menu. Select the quantitative variable and click the **Y, Response** button. Select the categorical variable and click the **X, Factor** button. Then click **OK**.

A window will appear in JMP with a dot plot of the quantitative variable for each group from the categorical variable. To obtain side-by-side box plots for the quantitative variable and a table of quantile values for the quantitative variable for

all groups, click on the red triangle next to the words **OneWay Analysis of . . .** and select **Quantiles**. To obtain a table of means and standard deviations for the quantitative variable for all groups, click the red triangle and select **Means and Std Dev**. To obtain inference for the difference in the population means, click the red triangle and select **t Test**. A table will appear with information about both a hypothesis test and a confidence interval for the difference in the population means. To select a different confidence level, click the red triangle and select **Set  $\alpha$  level**. The value 0.10 corresponds to the 90% level, 0.05 to the 95% level, 0.01 to the 99% level, etc.

#### 8. Obtaining Descriptive Statistics for the Relationship Between Two Quantitative Variables – Linear Regression

To look at the relationship between two quantitative variables, **Analyze - Fit Y by X** from the JMP menu. Select the quantitative response variable and click the **Y, Response** button. Select the quantitative explanatory variable and click the **X, Factor** button. Then click **OK**.

A window will appear in JMP with a scatterplot of the two variables. To obtain the least squares regression line, click on the red triangle next to the words **Bivariate Fit . . .** and select **Fit Line**. The least squares regression line will be added to the scatterplot and the regression equation and other information added to the window. To add a residual plot to this window, click on the red triangle located just under the scatterplot window next to the words **Linear Fit** and select **Plot Residuals**.

#### 9. Printing Output

To print any output window in JMP, click **File – Print** from the JMP menu. In the window that appears, select the printer and click **OK**.

#### 10. Saving Output

Output from JMP can be saved in Microsoft Word. To save the output to this format, select **File – Save As** from the JMP menu. Under **Save as Type:** select **Microsoft Word 2000+ (\*.DOC)**. Then enter a name for the file and click **Save**. You can then open and work with this file in Microsoft Word and print when finished. This enables you to edit output from JMP, add text to the output, or add output and graphics to any Microsoft Word file.