# JMP - AN INTRODUCTORY USER'S GUIDE

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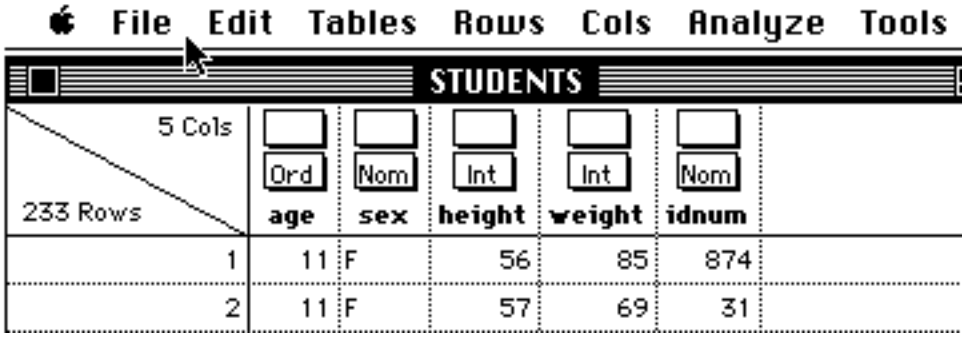
Written specifically as material for CHANCE courses

July 24, 1992

This guide is intended to help you begin to use JMP, a basic statistics package, and apprise you of its general capabilities and limitations. This manual assumes that you are familiar with operating a Macintosh computer. Its purpose is not to explain the meaning of statistical tests and terms. Before attempting to use JMP you must decide what you need to do with your data and what results you would like to see. This manual takes you from that point and teaches you how to get the information you seek from JMP. Please refer to your textbook or professor for a detailed understanding of the statistics and probability involved in your project.

## GETTING STARTED

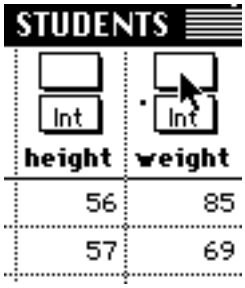
To use JMP and create a new file, double click on the JMP icon and select *New* from the *File* menu. To open a sample datafile or any other JMP datafile just double click on the icon. This automatically opens the JMP application as well as the datafile.



JMP looks like a spreadsheet. In order to use it, you must first fill the columns with your data. Then you must ask JMP to analyze the data according to specifications that will yield the results you desire. When you create a new file, one column will automatically appear. You can begin putting data in that column by highlighting the first block and typing in a piece of information. Hit the tab key to move to the next row. Additional columns can be created and deleted by selecting from the *Cols* menu. Please note that you MUST create additional columns by using the command *New Column*. You cannot just finish a column, move the cursor to the next column, and continue typing as you would with a normal spreadsheet.

Use the tab and return keys to move around the spreadsheet. Information can be changed by highlighting the data you want to replace and typing in the new data. There is a command to add new rows under the *Rows* menu. Most of the commands needed to input your data are self-explanatory.

The most complicated thing about JMP is that it requires you to properly define what type of data appears in each column. For example, immediately above the title of the column is a little box with letters in it.




If you click on it you will see that three choices appear, *interval*, *ordinal*, or *nominal*. Every column you use must be defined as *interval*, *ordinal*, or *nominal* and these are known as data types. The meaning of these terms will be explained later in this section. You can change the data type of a column by using the pop-up menu above the title of the column.

When ever you create a new column, you have to specify its *Data Type* as well as its *Measurement Level*, *Format*, and *Formula* status. You can always change the specifications of a column by either choosing *Column Info* from the *Cols* menu or by double clicking on the white area above the name of a column.

You must choose if the *Data Type* is *interval*, *ordinal*, or *nominal*, and also if the *Measurement Level* is *character*, *numeric*, or *row state*. <u>These choices are extremely important because the way that you define your data determines the types of analyses that JMP performs for you.</u> *Format* refers to the appearance of the data; namely, how many

decimal places, if any, do you want. *Best* means JMP looks at the data and decides what is best. By choosing *Decimal* you specify a certain number of decimal places. *Date* means that the data is composed of dates. The *Formula* box lets you choose to use the calculator option and specify a formula to compute the values of the column. For example, this lets you create a Column called "Total Scores" that is composed of the sum of two other columns, Verbal SAT Scores and Math SAT Scores.

**STEP ONE - DEFINING DATA TYPE AND MEASUREMENT LEVEL**

The first thing to remember about defining your data is that you can easily reclassify it at any time by clicking on *Col Info* or in the box above the title of the column. If fact, you will probably want to experiment with the different possibilities for graphs, summaries, etc. by doing exactly that. Change a column from interval to ordinal or nominal and re-draw histograms and see how the information that accompanies the graph changes.

Here is a quick summary of what the different terms mean.

*Data Types:*

A) *Numeric* - numbers only, with or without a decimal point. Numeric data can be assigned interval, ordinal, and nominal measurement levels.

B) *Character* - can be numbers or non-numeric data (e.g. words). The numbers act like labels; JMP does not use them in mathematical computations.

C) *Row State* - for now, ignore this option. The meaning of *Row State* data will be explained later in this manual under the section **Markers**.

The basic rule is to choose between *numeric* and *character*. If you are using words, choose *character*. If you are using numbers and you want the computer to treat them like numbers, choose *numeric*. If you are using numbers that represent something to you or your study other than their usual numerical value, choose *character*. If you are inconsistent, JMP will tell you and ask you to change the *Data Type* of a column if you try to assign a measurement level that is unacceptable.

*Measurement Levels*:

A) *Interval* (numeric measurements) - You can only designate a column as interval if it contains numeric data. Numbers have both order and magnitude, meaning they can be used to order data and/or they can be used for their magnitude. When you

designate data as interval, the computer uses the numbers for their real magnitude. For example, the numbers 1, 2, 3 when used for order or rank just show that 3 is larger than 2 which is larger than 1. When used for its magnitude, the computer treats the number "3" as a real number and uses it in computations. In sum, JMP treats your data as real numbers in computations and uses their values directly.

B) *Ordinal* (means ordered in some way) - Can be either numeric or character type data. JMP treats ordinal columns as discrete categorical values that have an order. It alphabetizes words or letters and arranges numbers by numerical sequence. In sum, it uses numbers for their order, not their magnitude.

C) *Nominal* (classifications for letters or numbers) - Can be either numeric or character data types. All values are treated as being discrete with no order. You are basically using this data to give something a name or classification.

This may sound rather confusing, and it many ways it is. The good news is that the semantics themselves don't matter that much and you will quickly become used to the idiosyncrasies of JMP. What is important is that you know which measurement levels to assign to your data in order to do regression analysis or find correlations, etc. This guide includes a table that lists most of the important capabilities of JMP and how to define your data in order to do the analyses you desire. Remember that no choice you make is set in stone and you can always change data types and measurement levels.

**STEP TWO - ANALYZING DATA**

JMP gives you a choice of ways to analyze data under the *Analyze* menu. The table that appears below this section gives examples of which options yield which results, charts, and information. In general, the choices are rather self-explanatory. To analyze one sample at a time, choose *Distribution of Ys*. This will give you the standard one-sample descriptive statistics (histogram, mean, Std, quantiles, etc.) as well as one-sample hypothesis tests. Almost all of the more complicated data models can be found by using the analysis option, *Fit Y by X* . *Fit Y by X* does regression, logistic regression, the two sample t-test, and contingency table analysis. Depending on the measurement level you assign to your data, JMP will carry out different types of analysis. When you choose *Fit Y by X*, JMP chooses tests relevant to the measurement level of the data. You can see this most easily by studying the following chart. For multiple regression, choose *Fit Y by X's*.

**CAPABILITIES OF *Fit Y by X* DEPENDING ON THE MEASUREMENT LEVEL**

| | **X** INTERVAL | **X** NOMINAL/ORDINAL |
|---|---|---|
| **Y** INTERVAL | Regression/Correlation | Two Sample (t-test) or K-Sample Data (Anova) (Anova is not explained in this manual) |
| **Y** NOMINAL/ORDINAL | Logistic Regression (not explained in this manual) | Contingency Table and Chi-Square Test |

**DEFINING YOUR VARIABLES**

In order to analyze any of your data, you must first select independent and dependent variables. There are three ways to choose X and Y variables.

1) You can choose from the pop-up menu in top box above the title of the column.
2) You can click on the type of analysis you desire and then choose X and Y variables from the box that appears on the screen and prompts a choice.
3) You can choose *Assign Roles* from the *Cols* menu.

*X* - identifies the information in a column as independent variables.

*Y* - identifies the information in a column as dependent variables.

*Weight* - identifies a column whose values supply weights for each Y variable.

*Freq* - identifies a column whose values assign a frequency to each row for analysis.

*Label* - identifies a column whose values serve merely as labels for information in other columns.

## QUICK REFERENCE TABLE FOR ANALYZING DATA

The following is a table that should be of use to you in determining what measurement level to assign your data and which analysis to choose.

| **DESIRED RESULTS:** | **ROLE** | **MEASUREMENT LEVEL** | **ANALYSIS** |
|---|---|---|---|
| TO ANALYZE ONE SAMPLE AT A TIME:<br>histogram<br>max, min, media, quartiles (*Quantiles*)<br>mean, Std, N count (*Moments*)<br>t-test (pop-up menu next to title above histogram under *Test Mean=value*) | Y | INTERVAL | DISTRIBUTION OF Y's |
| ANALYZING ONE SAMPLE AT A TIME<br>histogram/stacked bar chart<br>counts, proportions (*Profile*) | Y | NOMINAL/ ORDINAL | DISTRIBUTION OF Y's |
| CORRELATION/REGRESSION<br>scatter plot<br>regression line (pop-up menu under *Fitting - Fit Line*)<br>mean line (pop-up menu under *Fitting - Fit Mean*)<br>correlation (pop-up menu under *Fitting* - you must choose any *Density Ellipse*)<br>confidence curves (options under pop-up menus for each fit)<br>Std, mean (text under *Bivariate* which appears after you fit a *Density Ellipse*)<br>R Square (*Sum of Fit*)<br>slope and intercept (*Parameter Estimates*) | Y<br>X | INTERVAL<br>INTERVAL | FIT Y BY X |

| | | | |
|---|---|---|---|
| COMPARING TWO SAMPLES<br><br>side-by-side plot<br><br>mean, Std (*Fit Means* from pop-menu under scatter plot)<br><br>side-by-side box plot (Fit Quantiles from pop-up menu under scatter plot)<br><br>two sample t-test or Student's t (*Compare each Pair* from pop-up menu under scatter plot) | Y<br><br>X | INTERVAL<br><br>NOMINAL/ORDINAL | FIT Y BY X |
| CONTINGENCY TABLE<br><br>stacked bar chart<br><br>Pearson's Chi-Square test (*Analysis of LogLikelihood*, last line)<br><br>counts for each variable (*Response Counts*)<br><br>proportions for each variable (*Response Profiles*) | Y<br><br>X | NOMINAL/ORDINAL<br><br>NOMINAL/ORDINAL | FIT Y BY X |
| MULTIPLE REGRESSION<br><br>R Square (*Summary of Fit*)<br><br>estimates for a formula (*Parameter Estimates*)<br><br>to plot this three variables, go to *Analyze* menu and choose *Spin.* | Y<br><br>X<br><br>X | INTERVAL<br><br>INTERVAL<br><br>INTERVAL | FIT Y BY X's |

## HOW TO MAKE YOUR HISTOGRAM HORIZONTAL INSTEAD OF VERTICAL

If seeing your histograms and bar charts vertical annoys you and you would prefer to see them horizontal, here is how to fix the problem. Look in the pop-up menu at the check mark at the lower left hand corner of the window. There you should find an option called *Horizontal Layout.* When you choose this, a check mark appears next to the words *Horizontal Layout* and everything in the window changes to a horizontal display. You can revert back to a vertical display by turning off *Horizontal Layout.* Just choose it again from the pop-up menu and the check mark will disappear.

## SAVING YOUR DATA

In order to save your spreadsheet, use the *Save* command under the *File* menu as you would for any other Macintosh program. To save graphs and analyses, use the $

menu in the lower left hand corner of each window to save the information you have generated.

**HOW TO STOP JMP IF YOU MAKE A MISTAKE**

In case you make a goof and need to interrupt a JMP analysis process, try Command period (hitting the apple key and the period at the same time). This should abort any process.

**EXAMPLES:**

**I. TRYING OUT JMP**

**A. How to make a histogram**

Begin by opening the file in SAMPLE DATA called GOLF BALLS. You should find a spreadsheet with three columns, Brand (nom), Distance (int), and Durability (int).

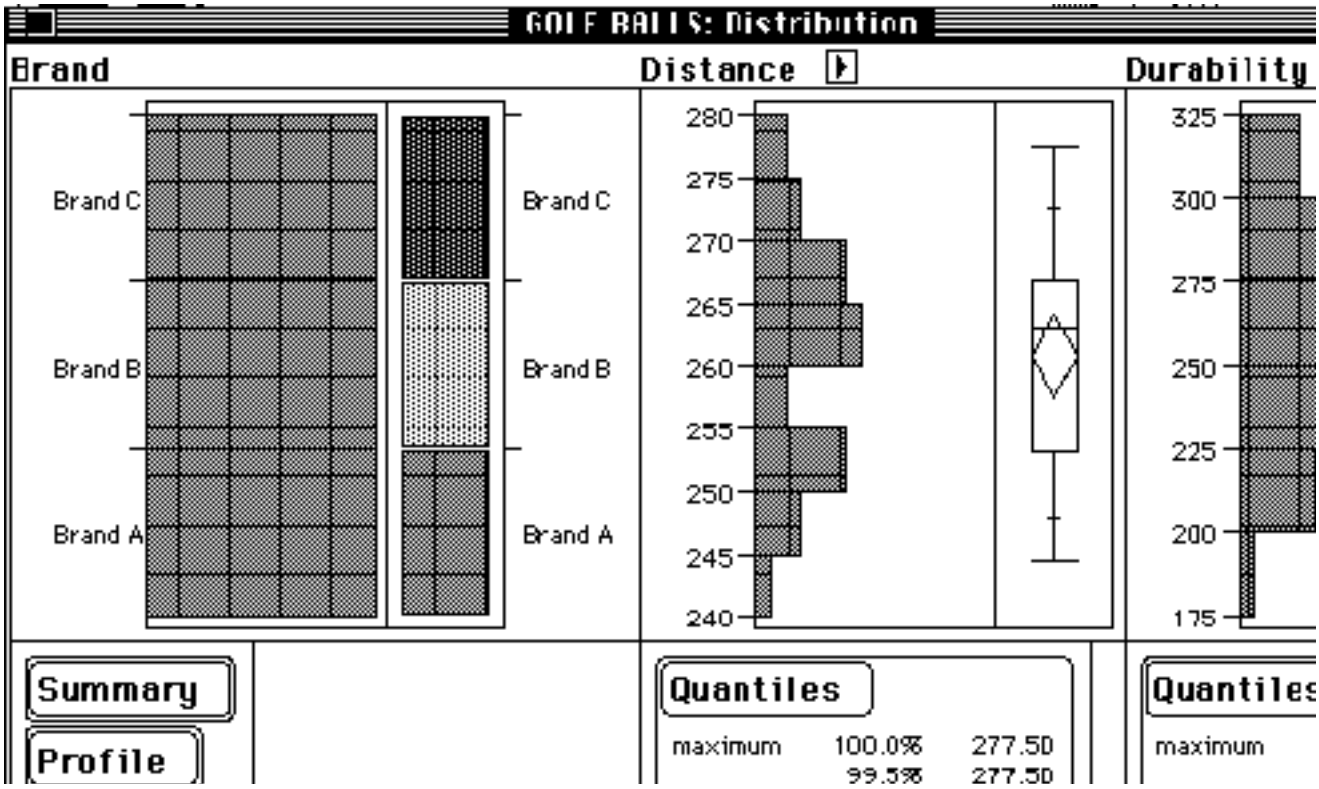
GOLF BALLS

| 3 Cols / 30 Rows | Brand (Nom) | Distance (Int) | Durability (Int) |
|---|---|---|---|
| 1 | Brand A | 251.2 | 310 |
| 2 | Brand B | 263.2 | 261 |
| 3 | Brand C | 269.7 | 233 |
| 4 | Brand A | 245.1 | 235 |

Go to the *Analyze* menu and choose *Distribution of Y's.* Click on *Brand* and then click on *Add* to move it into the box on the right. Do this for Distance and Durability so that all three appear in the box on the right. Click on *Done.* This tells JMP to draw histograms for each of the three columns and to analyze the results one sample at a time.

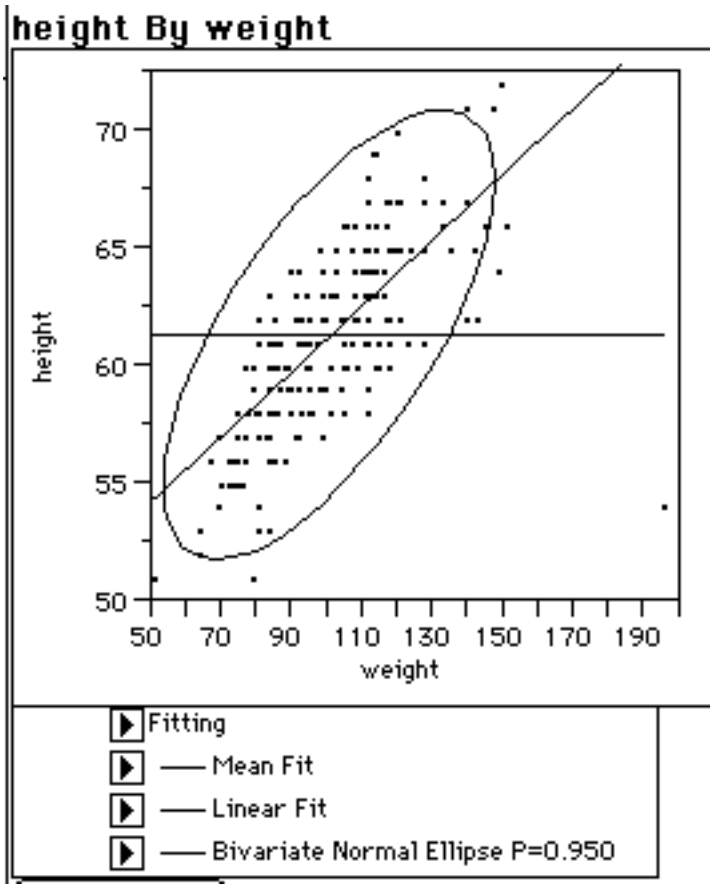
JMP will draw histograms for each of the three variables and provide either *Summaries* and *Profiles* or *Quantiles* and *Moments*, depending on the measurement level of the column. Click on the word *Summary* and watch the information in its box disappear. Click on *Summary* again and watch the text reappear. This is an option for all JMP windows. Move the cursor to the column name above the histogram for Distance and click on the bold half-triangle to view a pop-up menu. Choose *Test Dist =Mean* and type in a hypothetical mean. JMP will run a t-test for you and display the results. Note

that a t-test is an option only for data that is *interval*. Ask your professor to explain the meaning of the information provided by JMP or consult a textbook.



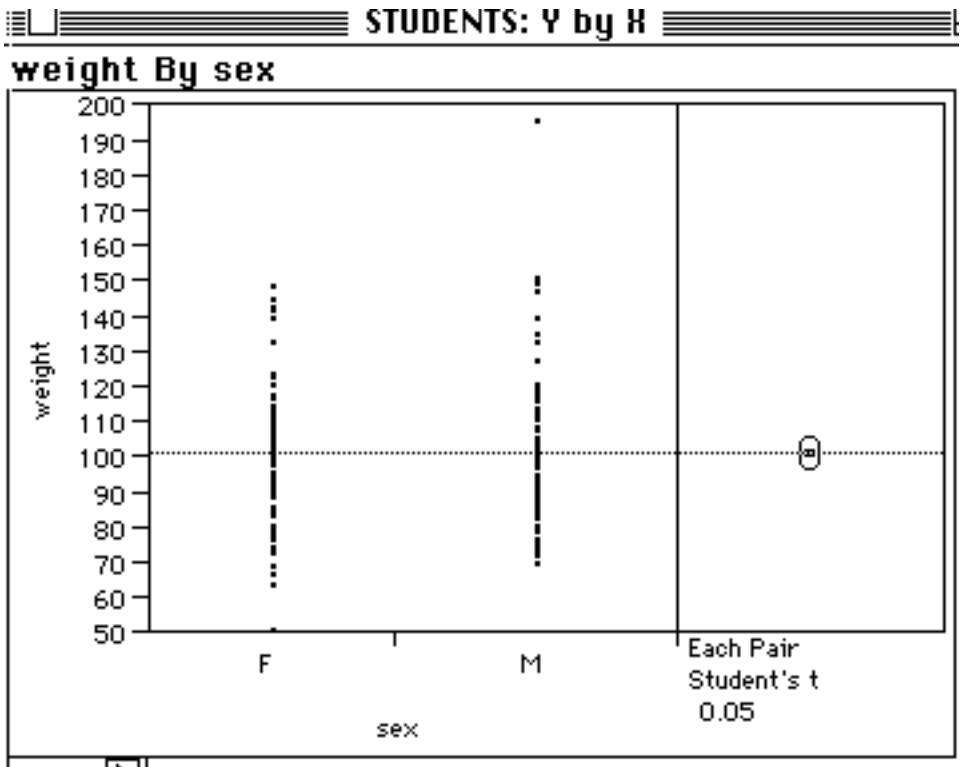

**B. Simple Regression**

Let's try simple regression analysis using JMP. Begin by opening the file in SAMPLE DATA called STUDENTS. You should find a spreadsheet with five columns, age, sex, height, weight, idnum. From the analysis menu, choose *Fit Y by X*. Assign *Height* to be the Y variable and *Weight* to be the X variable. JMP draws a scatter plot for you and gives you the option to fit a regression line as well as polynomials, splines, and density ellipses. From the pop-up menu that appears next to the word *Fitting*, choose *Fit Mean* and *Fit Line* (this is a regression line). Take a look at the lines that now appear on the scatter plot. For additional details, click on the words *Mean Fit* and *Linear Fit* for more text displays. To find the CORRELATION between the two variables, choose *Density Ellipses* from the *Fitting* menu and pick any value. An ellipse will appear on the scatter plot and the word *Bivariate* will appear under the scatter plot. As described above, click on the word *Bivariate* to see additional text details, including the correlation. You can find the slope and intercept for the regression line in the text under the *Parameter Estimates* box. The best way to learn the capabilities of JMP is to experiment with it by trying different fits and observing the results.




**C. Two-Sample Tests (t-test)**

Open the file called STUDENTS in the SAMPLE DATA file. Go to the *Analyze* menu and choose *Fit X by Y*. Assign sex as the X variable and weight as the Y variable. This is extremely important because JMP will only perform this test if X is *nominal* or *ordinal* and Y is *interval*. You should see a side-by-side plot and a half-triangle with a pop-up menu below the plot. In order to run a two-sample test, choose *Compare Each Pair* from the pop-up menu. The display should look like the example below. The results of the t-test appear when you click on the *Means Comparisons* box.




**Means Comparisons**

| Dif=Mean[i]-Mean[j] | M | F |
|---|---|---|
| M | 0.00000 | 4.42424 |
| F | -4.42424 | 0.00000 |

Alpha= 0.05

**Comparisons for each pair using Student's t**

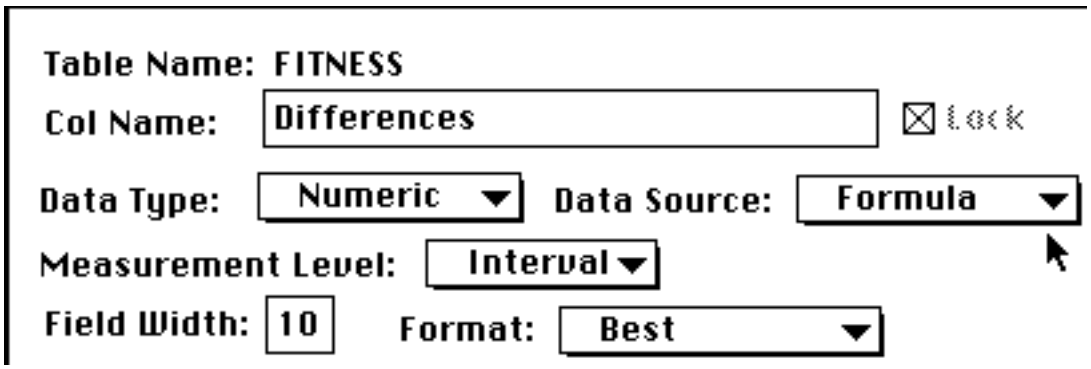
t
1.97031

| Abs(Dif)-LSD | M | F |
|---|---|---|
| M | -4.77887 | -0.51631 |
| F | -0.51631 | -5.09710 |

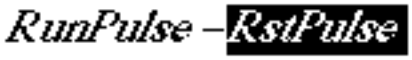
Positive values show pairs of means that are significantly different.

**II. USING THE CALCULATOR** - How to make a new column that is the difference of two other existing columns

Begin by opening the file in SAMPLE DATA called FITNESS. Suppose you would like to know the difference for each row between the resting pulse and the pulse after running. Go to the *Cols* menu and choose *New Column*. Change the *Data Source* from *No Formula* to *Formula* , re-name the column *Differences*, and click on *OK*.

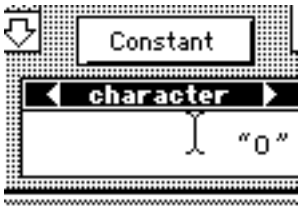



Now you are in the calculator mode. The rectangular box at the bottom of the screen is where you can create formulas. Make sure that the small box is highlighted. If it is not, click on it to highlight it. Click on *RunPulse* in the box in the upper left hand corner. Next click on the minus sign and last click on *RstPulse*. If you make a mistake, highlight the whole formula you have created and hit the delete button on the keyboard. Close the window and JMP will compute the new values for the column.



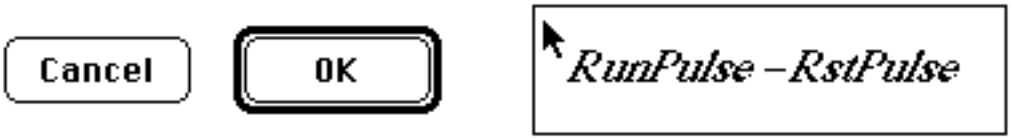

This same technique can be used to create simple formulas to compute new columns. The best way to learn to use the calculator is to spend a few minutes playing around with the different options. Here are a few hints about the calculator and formula columns in general.

a. If you want to insert a number into a formula, first locate the box underneath the *constant* key on the calculator. Click on the arrows until the title of the box reads *numeric*. Type the number you want to insert in the formula in the box. While the number is highlighted, click on the *constant* key which will insert the number into your formula. If you need to insert a number in quotes like "0", follow this same procedure, except change the title of the box from *numeric* to *character*.




b. If you need to change the formula of a column or if you just want to view the formula box, either choose *Col Info* from the *Cols* menu or double click on the top of the

column next to the small box that designates the role (X, Y, etc.) When a new screen appears with information about the column, double click on the formula that appears in the lower right hand corner. The calculator should appear.




**III. SIMULATIONS** - How to simulate tossing a coin with JMP

In order to simulate tossing a coin, we will write a short formula to make JMP generate a list of uniform random numbers (this means that the numbers all lie between 0 and 1) and then assign values of 0 or 1 to the numbers depending upon their values. This simulation will be for a fair coin, so the chance of getting a head ( "1") or a tail ("0") is equal. The "0"s and "1"s act as labels to signify heads or tails so we designate the column as *character*.

Step 1 - Choose *New Column* from the *Cols* menu. Format the new column to be of *character* data type and of *nominal* measurement level. Also choose *Formula* rather than *No Formula*. Click on *OK*.

Step 2 - Now you should be in the calculator mode. Begin by clicking on *Conditions* in the function box in the upper right hand corner and then click on the word *If* that appears in the *Conditions* menu. In the calculator, the box following the word *If* should be highlighted. If it is not, highlight it.

Step 3- Go back up to the function menu and click on *Comparisons*. Click on *x>y*. In the calculator, highlight the box following *If*. Click on *Random* in the function box. When the *Random* menu appears, click on *Uniform*. The box following *If* should now read *?Uniform*.

Step 4- Now highlight the box following the > sign. Go to the box below the word *constant*, and make the title read *numeric*. Type in .5 and then click on the *constant* key in order to insert the number into the box in the calculator.

Step 5 - There should only be two empty boxes left in the calculator. Highlight the box preceding *If*. Go back to the box below the *constant* key, but now change the title to *character*. Type a 0 in the box (it should appear in quotes), and click on the constant key to insert "0" into the box in the calculator. Repeat this procedure for the last box to fill it with "1". The final formula should read:

$$\begin{cases} \text{“0”}, & \text{if ?uniform}<0.5 \\ \text{“1”}, & \text{otherwise} \end{cases}$$

Step 6 - Close the window to return to the spreadsheet. By adding rows (*Rows* menu), you can simulate as many tosses of a coin as you desire. Try making a histogram of the trials and checking the mean and the number of heads and tails. Is it what you expected? The more tosses, the closer the results should be to the expected value.

In order to simulate a biased coin, change the value in the clause *?uniform* > ___.

**IV. EXPONENTIAL DISTRIBUTION** - How to take the -log of random numbers

Sometimes you may need to generate random numbers that have distributions other than a normal distribution. For example, if you take the negative log of a series of uniform random numbers, the distribution will be what we call exponential. Here is an example of how to do just that.

You should now be familiar with getting into the calculator mode. Create a new column that requires a formula. Once you are in calculator mode, choose *Random* from the functions menu. Click on *Uniform*. Next choose *Transcendental* from the functions menu and Click on *Natural Log*. Last, click on the +/- box of the calculator keypad to make the whole statement negative. The final formula should read:

$$-\ln(?\text{uniform})$$

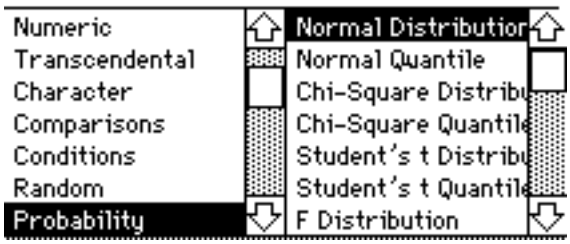
Close the window and add rows until you get the amount of data you desire. Draw a histogram and compare the shape of the distribution to a normal distribution.

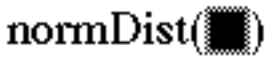
**V. FINDING THE AREA UNDER THE NORMAL CURVE**

JMP also has the capability of serving as a statistical table for certain values. It is very simple to find areas under the normal curve. To demonstrate practical use for this computation, let's use the example of test scores. Suppose that the mean on a certain test is 80, the Std = 5, and you scored 88. What percentage of people scored worse than you, or in other words, in what percentile did you score? Note that you are assuming that the scores follow a normal distribution.

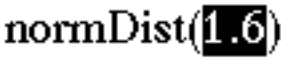
First calculate your score in Stds. Do this by subtracting the mean from your score (88-80=8) and dividing that by the Std (8/5=1.6). Now you can use JMP to find the normal distribution of 1.6.

Create a new column that requires a formula. When you are in calculator mode, click on *Probability* in the function menu and then on *Normal Distribution*. In the calculator box you should see the term *normDist* followed by an empty box in parentheses.




Look at the box under the constant key on the calculator keypad. If it does not read *numeric*, click on the arrows at the side of the box until it does. Enter 1.6 in the box, and click on the constant key to insert it into the formula.




When you close the window JMP will fill all the rows in the new column with the same value (slightly inconvenient, but unavoidable. If it bothers you, delete all the rows but one for that column). The number that appears in the new column, .95, gives you the percentage under the normal curve that is equal to or less than 1.6. This means that 95 percent of the students scored worse than you, or equivalently you scored in the 95th percentile.

Also in the *Probability* menu in the function box is the *Normal Quantile* function, the inverse of the *Normal Distribution* function. This allows you to input a quantile, for example .95, and JMP will calculate its corresponding point from the normal curve. In this case the response would be 1.6.

**OTHER USEFUL OPTIONS IN JMP**

This manual cannot detail all JMP functions, but it tries to introduce options that may be of use in your projects. Here are a few tricks that might come in handy.

**A. Grouping**

JMP lets you group together information so that you can easily view breakdowns by type, size, company, etc. in the summary tables of analyses. For example, what if you are trying to evaluate different kinds and sizes of personal computers by how easy they are to use and how much they cost. By clicking on *Group/Summary* from the

*Tables* menu, you can choose what columns you would like to group together. Experiment with this option to get the desired results.

**B. Markers**

JMP allows you to mark individual pieces of data with markers so that you can point out outliers, extremes, etc. For example, let's say you are playing with two columns, an X variable, and a Y variable, and you have drawn a scatter plot with *Fit Y by X* analysis. Suppose there are some outlying points and you would like to mark the rows on the spreadsheet that correspond to these points. Go to the *Rows* menu, choose *markers*, and pick one of them. For example, if you choose the *x*, any point that you highlight in the scatter plot will be marked with an *x*. You can highlight more than one point by shift clicking. When you return to the spreadsheet you will find that the outlying points you marked are also marked with *x*'s on corresponding rows on the spreadsheet. To erase these markers, choose *Clear Row States* from the *Rows* menu. Also note that if you merely highlight any part of the scatter plot or other plot (not using markers), the corresponding rows in the spreadsheet will also appear highlighted.

If you use markers to reveal information about certain rows in the spreadsheet, you may want to save that information. This is where the data type *Row States* comes into play. The markers are not part of any of the columns and they will not automatically be saved when you save the spreadsheet. Here is how to save your markers:

Create a new column and define the data type to be *Row States*. From a pop-up menu at the top of the new column, choose *Copy from Row State*. JMP will copy the markers into the new column. In practice, the column tells information about the "state" of the rows.

**C. Subsets**

With JMP you can create a new spreadsheet made up of a subset of only data you have selected. For example, you might make a new spreadsheet of the data from only the first 10 rows of the full data table or including only the outlying points on the scatter plot. In order to create a subset, simply highlight the rows you want to include in the new data table, and then select *Subset* from the *Tables* menu. On the screen a new data table will appear.

**WHAT JMP DOES NOT DO**

Although JMP has good capabilities for most simple tests and models in introductory statistics and probability, there are certain basic things it cannot do. JMP cannot do binomial distributions. In fact, there is no option in the calculator for factorial. The best you can do is to use the calculator to write a short formula to compute the

factorials of the row numbers using the *Product* function in the *Statistical* menu in the function box. You can get "i" (row #) from the *Terms* menu. To get "j" you need to click on *Index* from the*Statistical* menu. The formula should look like this:

$$\prod_{j=1}^{i} Column\ I_j$$

If you are really energetic, you can also use the calculator to write a short program to compute CHOOSE (n, i) for i = the row numbers. For example, if you have 5 rows in a column, n=5 and i=1, 2, 3, 4, 5, JMP will calculate how many ways there are to choose 1, 2, 3, 4, and 5 from a set of 5. The formula should look like this:

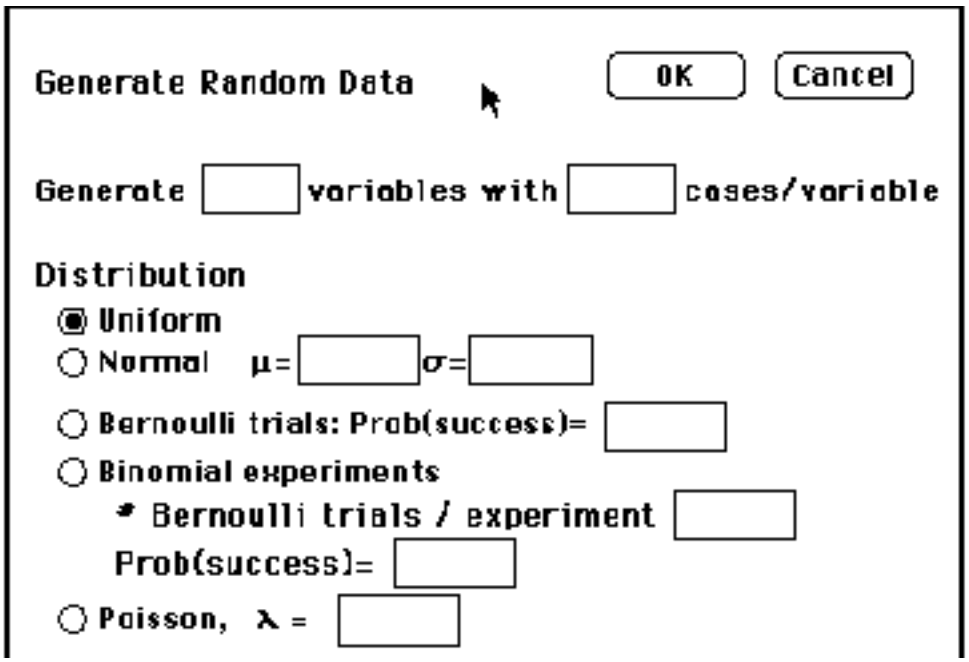
$$\prod_{j=1}^{i} \left(\frac{n-j+1}{j}\right)$$

**AN EASIER WAY TO DO SIMULATIONS - Using a program called Data Desk**

It is possible to do simulations, like tossing a coin for example, using JMP as is described above under the section of this manual titled SIMULATIONS. However, it is time-consuming and a multi-step process. If you need to do simulations, I recommend that you use the student version of program Data Desk if it is available.

The Data Desk format is very different from that of JMP. Instead of a spreadsheet appearance, Data Desk generates a small window for each column you create. If you put them all together side-by-side and match up the rows, they resemble a spreadsheet.

In order to simulate tossing a coin, go to the *Manip* menu and choose *Generate Random Numbers*. The number of variables you ask the program to generate refers to how many sets of data you want the computer to create. The number of cases/variable refers to the number of trials per variable. For example, if you ask for 2 variables with 100 cases each, two icons will appear on the screen each containing a list of 100 numbers.




*Uniform* random numbers lie between 0 and 1. Their distribution is uniform, not normal.

*Normal* generates random numbers with a normal distribution. By default this refers to a distribution with mean=0, centered at 0, Std=1. You can choose μ (mu, the mean) and σ(sigma, the Std) by filling in the blanks to choose a different normal distribution.

*Bernoulli trials* generate a series of 0s and 1s which is useful for simulations like tossing a coin. You set the probability of getting a 1 which marks a success. For example, for a fair coin, p=.5.

*Binomial experiments* gives you the option of having the computer do a number of Bernoulli trials per experiment and add up the successes. You enter the probability of success just as you would for a simple series of Bernoulli trials. If you ask the computer to "Generate 2 variables with 100 cases/variable" and to do "100 Bernoulli trials/experiment," this is what will happen. For each of your 100 cases, the computer will do 100 experiments and sum the successes. It will do that 100 times per variable and you asked for 2 variables. This is really (100*100) * 100 trials for each variable.

*Poisson* generates random numbers with a poisson distribution. You must input the value of λ (lamda).

**TROUBLESHOOTING**

If you have problems or questions, first try JMP Help. You can get help by choosing the *?* from the tools menu and the clicking on graphs, plots, or tables to view help windows. If you still have questions, ask your professor for the JMP User's Guide which is a 500 page manual and is certainly more detailed than this short guide. However, it is also more complicated, so be forewarned. If you or your professor have questions that are not addressed in the official JMP guide, call the SAS Institute in Cary NC at (919) 677-8000 and ask for a JMP consultant. You need to give them the serial number for your JMP package or server. A consultant will research your question and try to give you a response within 24 hours.

References:

*JMP Introductory Guide Version 2 of JMP*. Cary, NC, SAS Institute Inc., 1989.

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Pearl, Dennis K. and Elizabeth A. Stasny. *Experiments in Statistical Concepts*. Dubuque, Iowa, Kendall/Hunt Publishing Company, 1992.

Velleman, Paul F. *Learning Data Analysis with Data Desk*. New York, W.H. Freeman and Company, 1989.