

Getting Started with SPSS for Mac OS

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Introduction

How to Use this Document

This document introduces prospective researchers to SPSS for Mac OS, which currently runs only under Mac OS X 10.6 or higher. Those who do not own a personal copy of SPSS for Mac OS X may access the software from various UITS Student Technology Centers at IU. Under the SPSS Enterprise License Agreement, faculty, staffs, and students can purchase SPSS CD for use at home.

What is SPSS?

SPSS is a comprehensive and flexible statistical analysis and data management system. SPSS can take data from almost any type of file and use them to generate abulated reports, charts, and plots of distributions and trends, descriptive statistics, and conduct complex statistical analyses. SPSS is available on Windows and Mac OS X on Indiana University campus. The latest version for Mac OS X is only available under OS X 10.6 or higher.

SPSS for Mac OS X provides a user interface that makes statistical analysis more intuitive for all levels of users. Simple menus and dialog box selections make it possible to perform complex analyses without typing a single line of command syntax. The built-in SPSS Data Editor offers a simple and efficient spreadsheet-like utility for entering data and browsing the working data file. High-resolution, presentation-quality charts and plots can be created and edited. Using the SPSS Viewer, you can handle the output with greater flexibility. SPSS for Mac OS X also reads data files from a variety of file formats including Excel, SAS, and Stata.

Hardware and Software Requirements

The minimum hardware and software requirements for SPSS for Mac OS X are:

- OS X 10.6 or higher
- Intel processor
- 1 GB RAM or more
- 800 MB free harddisk space
- DVD-ROM drive
- Super VGA (1024x768) or a high resolution monitor

Orientation

Windows in SPSS

There are a number of different types of windows that you will see in SPSS for Mac OS:

Data Editor window

This window displays the contents of the data file. You may create new data files, or modify existing ones with Data Editor. The Data Editor window opens automatically when you start a new SPSS session.

Viewer window

The Viewer window displays the statistical results, tables, and charts from the analysis you performed (e.g., descriptive statistics, correlations, plots, charts). A Viewer window opens automatically when you run a procedure that generates output. In the Viewer windows, you can edit, move, delete and copy your results in the Finder.

Pivot Table Editor window

Output displayed in pivot tables can be modified in many ways with the Pivot Table Editor. You can edit text, swap data in rows and columns, add color, create multidimensional tables, and selectively hide and show results.

Chart Editor window

You can modify and save high-resolution charts and plots by invoking the Chart Editor for a certain chart (by double-clicking the chart) in a Viewer window. You can change the colors, select different type fonts or sizes, switch the horizontal and vertical axes, rotate 3-D scatterplots, and even change the chart type.

Text Output Editor window

Text output not displayed in pivot tables can be modified with the Text Output Editor. You can edit the output and change font characteristics (type, style, color, size).

Syntax Editor window

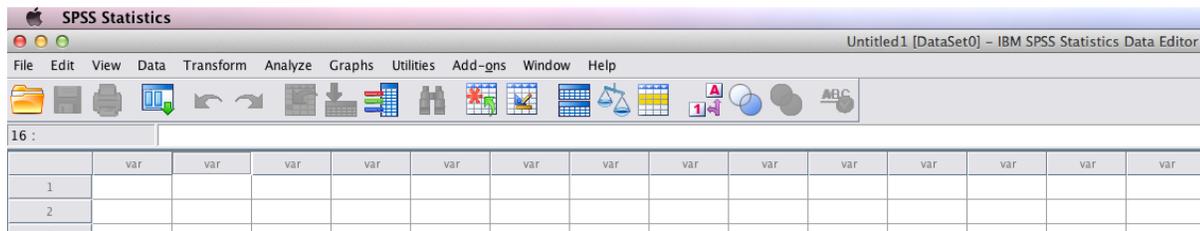
You can paste your dialog box selections into a Syntax Editor window, where your selections appear in the form of command syntax. You can then edit the command syntax to utilize special features of SPSS not available through dialog boxes. If you are familiar with SPSS software under other operating systems (e.g., Windows), you can open up a Syntax Editor window and enter SPSS commands exactly as you did under those platforms and execute the job. You can open multiple syntax windows and the contents of a Syntax Editor window may be saved for later use.

Script Editor window

Scripting (e.g., Python programming language) allows you to customize and automate many tasks in SPSS. Use the Script Editor to create and modify basic scripts.

Menus in SPSS for Mac OS

Many of the tasks you want to perform with SPSS start with menu selections. Each window in SPSS has its own menu bar with menu selections appropriate for that window type. The **Data Editor** window, for example, has the following menu with its associated toolbar:



Most menus are common for all windows and some are found in certain type of windows.

Common menus

File

Use the File menu to: Create a new SPSS system file, open an existing system file, read in spreadsheet or data files created by other software programs (e.g., SAS or Stata), read in an external ASCII data file from the Data Editor; create a command file, retrieve an already created SPSS command file into the Syntax Editor; open, save, and print output files from the Viewer and Pivot Table Editor; and save chart templates and export charts in external formats in the Chart Editor, etc.

Edit

Use the Edit menu to: cut, copy, and paste data values from the Data Editor; modify or copy text from the Viewer or Syntax Editor; copy charts for pasting into other applications from the Chart Editor, etc.

View

Use the View menu to: turn toolbars and the status bar on and off, and turn grid lines on and off from all window types; and control the display of value labels and data values in the Data Editor.

Analyze

This menu is selected for various statistical procedures such as crosstabulation, analysis of variance, correlation, linear regression, and factor analysis.

Graphs

Use the Graphs menu to create bar charts, pie charts, histograms, scatterplots, and other full-color, high-resolution graphs. Some statistical procedures also generate graphs. All graphs can be customized with the Chart Editor.

Utilities

Use the Utilities menu to: display information about variables in the working data file and control the list of variables from all window types; change the designated Viewer and Syntax Editor, etc.

Window

Use the Window menu to switch between SPSS windows or to minimize all open SPSS windows.

Help

This menu opens a standard Help window containing information on how to use the many features of SPSS. Context-sensitive help is available through the dialog boxes.

Data Editor specific menus

Data

Use the Data menu to make global changes to SPSS data files, such as transposing variables and cases, or creating subsets of cases for analysis, and merging files. These changes are only temporary and do not affect the permanent file unless you save the file with the changes.

Transform

Use the Transform menu to make changes to selected variables in the data file and to compute new variables based on the values of existing ones. These changes are temporary and do not affect the permanent file unless you save the file with changes.

Viewer specific menus

Insert

Use the Insert menu to change the page breaks.

Format

Use the Format menu to change font characteristics, underline, and bold.

Pivot Table Editor specific menus

Insert

Use the Insert menu to insert titles, captions, and footnotes; and to create table breaks.

Pivot

Use the Pivot menu to perform basic pivoting tasks, to turn pivoting trays on and off, and to go to specific layers in a multidimensional pivot table.

Format

Use the Format menu to modify table and cell properties; to apply and change TableLook formats; and to change font characteristics, footnote markers, and the width of data cells.

Chart Editor specific menus

Options

Use the Options menu to change x/y reference line and add title.

Elements

Use the Elements menu to add a fitted regression line in a scatter plot.

Text Output Editor specific menu

Insert

Use the Insert menu to change the page breaks.

Format

Use the Format menu to change font characteristics, underline, and bold.

Syntax Editor specific menu

Run

Use the Run menu to run the selected commands.

Script Editor specific menu

Macro

Use the Macro menu to run your code.

Debug

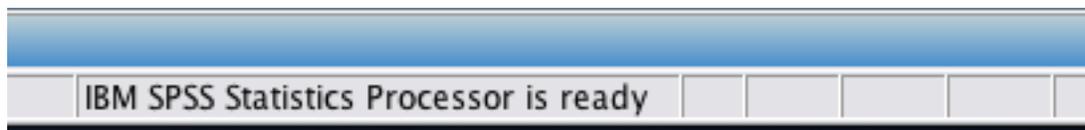
Use the Debug menu to step through your code, executing one line or subroutine at a time and viewing the result. You can also insert a break point in the script to pause the execution at the line that contains the break point.

Toolbars in SPSS for Mac OS

Each SPSS window has its own toolbar that provides quick and easy access to common tasks. ToolTips provide a brief description of each tool when you put the mouse pointer on the tool. For example, the toolbar with Syntax Editor window shows the following tooltip when the mouse pointer is put on the Open syntax document icon:



Status Bar in SPSS for Mac OS

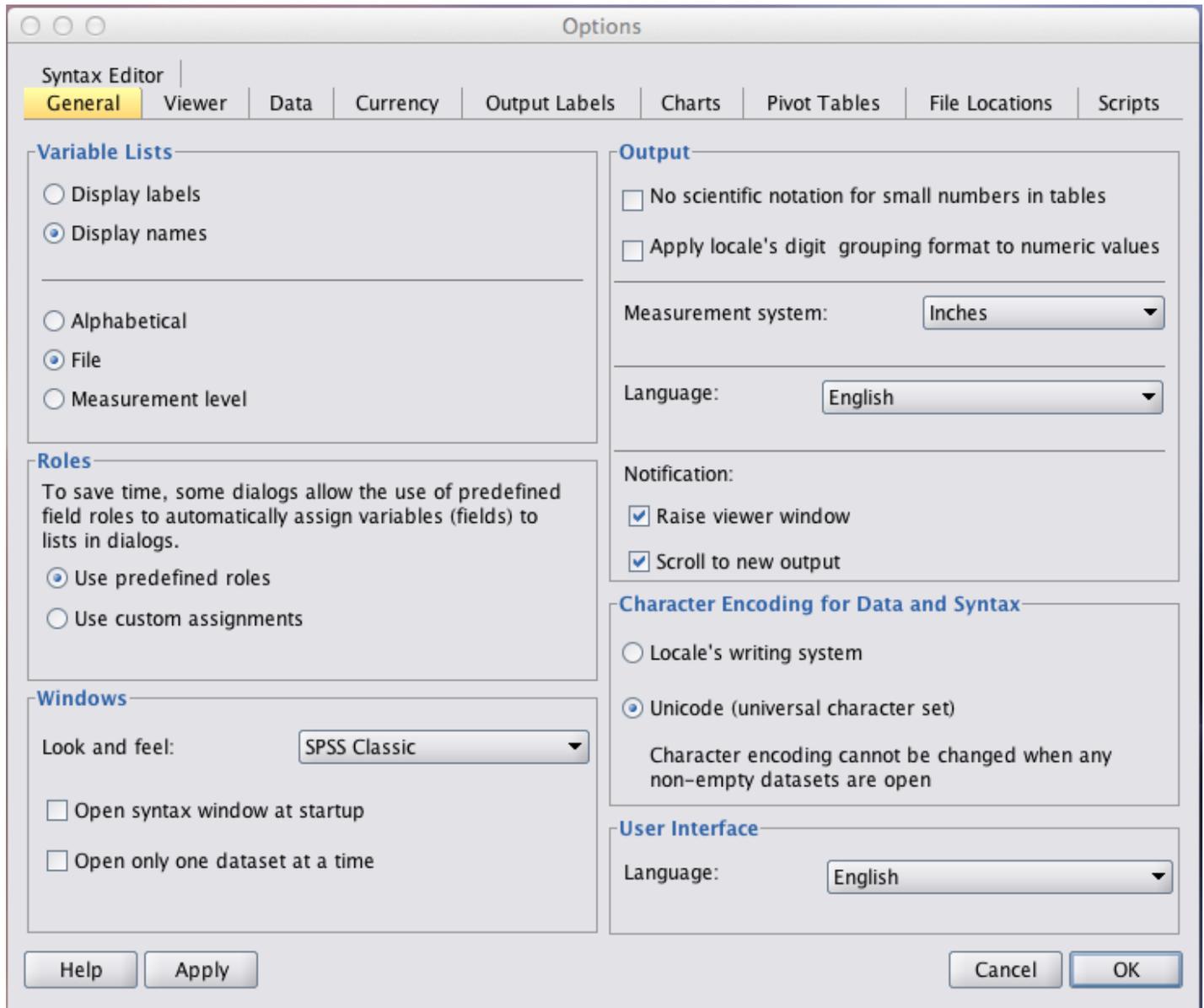


A status bar at the bottom of the SPSS application window indicates the current status of the SPSS processor. If the processor is running a command, it displays the command name and a case counter indicating the current case number being processed. When you first begin an SPSS session, the status bar displays the message **Starting SPSS Processor**. When SPSS is ready, the message changes to **SPSS Processor is ready**. The status bar also provides information such as command status, filter status, weight status, and split file status. The following status bar in an **Viewer** window, for example, shows that the current Viewer window is the designated output window and the SPSS is ready to run:

Options in SPSS for Mac OS

You can personalize your SPSS session by altering the default Options settings.

- Select **SPSS Statistics/Preferences**



- Click the tabs for the settings you want to change.
- Change the settings.
- Click **OK** or **Apply**.

For example, within variable list boxes in dialogs, you have the option to display the variable name as always or the variable label (up to 255 characters) can be displayed.

- Click **General** from the **Options** dialog box
- Click either **Display labels** or **Display names** under the **Variable Lists**
- Click **OK**

Preparing Your Data for Analysis

Organizing Your Data for Analysis

Suppose you have three test scores collected from a class of 10 students (5 males, and 5 females) during a semester. Each student was assigned an identification number. The information for each student you have is an identification number, gender of each student, and scores for test one, test two, and test three (the full data set is displayed toward the end of this section for you to view). Your first task is to present the data in a form acceptable to SPSS for processing.

SPSS uses data organized in rows and columns. Cases are represented in rows and variables are represented in columns.

Name	Test1	Test2	Test3
Tim	20	23	24
Hans	21	26	28

A case contains information for one unit of analysis (e.g., a person, an animal, a machine). Variables are information collected for each case, such as name, score, age, income, educational level. In the above chart, there are two cases and four variables. When data in files are arranged in rows and columns (as shown above), it is called cases-by-variables, or rectangular data files.

In SPSS, variables are named with eight or fewer characters. They must begin with a letter, although the remaining characters can be any letter, any digit, a period, or the symbols (@, #, _, or \$). Variable names cannot end with a period. Variable names that end with an underscore should be avoided. Blanks and special characters such as &, !, ?, ', and * cannot be used in a variable name. Variable names are not case sensitive. Each variable name must be unique; duplication is not allowed.

Most variables are generally numeric (e.g., 12, 93.23) or character/string/alphabetic (e.g., F, f, john) in type. Maximum width for numeric variables is 40 characters, the maximum number of decimal positions is 16. String variables with a defined width of eight or fewer characters are short strings, more than eight characters (up to 255 characters) are long strings. Short string variables can be used in many SPSS procedures. You may leave a blank for any missing numeric

values or enter a user-missing (e.g., 9, 999) value. However, for string values a blank is considered a valid value. You may choose to enter a user-missing (e.g., x, xxx, na) value for missing short string variables, but long string variables cannot have user-missing values.

Following the conventions above, let us assign names for the variables in our data set: id, sex, test1, test2, and test3. Once the variables are named according to SPSS conventions, it is a good practice to prepare a code book with details of the data layout. Following is a code book for the data in discussion. Note that this step is to present your data in an organized fashion. It is not mandatory for data analysis. A code book becomes especially handy when dealing with large number of variables. A short sample data, like the following, may not need a code book, but it is included for illustration.

var. name	width	columns	var. type	var.
labels	id	2	8	Numeric
identification no.	sex	1	8	
String	student gender (f, m)	test1	2	
8	Numeric	test one score	test2	2
8	Numeric	test two score	test3	2
8	Numeric	test three score		

In the above code book, **width** stands for the number of fields/columns taken by each variable. For example, the value for variable **id** takes a maximum of two fields since the highest identification number in our example is going to be 10. The value for variable **sex** takes a maximum of one field, and so on. **Columns** affect only the display of values in the Data Editor. Changing the column width does not change the defined width of a variable. **Var. type** specifies the data type (numeric, comma, dot, scientific notation, date, custom currency or string). In our example, sex is the only string variable coded as **f** for female, **m** for male.

The next issue is entering your data into the computer. There are several options. You may create a data file using one of your favorite text editors (e.g., TextEdit). Files created using word processing software should be saved in text format before trying to read them into an SPSS session. You may enter your data into a spreadsheet (e.g., Excel) and read it directly into SPSS for Mac OS. Finally, you may enter the data directly into the spreadsheet-like Data Editor of SPSS for Mac OS. In this document we are going to examine two of the above data entry methods: using a text editor, and using the Data Editor of SPSS for Mac OS.

Using an Editor to Enter Data

Let us first look into the steps for using a text editor for entering data. Note that if you have a data set with a limited number of variables, you may want to use the **Data Editor** to enter your data. However, this example is for illustration purposes. Open up your editor session, or word processing session, and enter the variable values into

appropriate columns as outlined in the code book. Your completed data file will appear as follows. (Note: The first line is included as a column marker line and is not part of the data. It must be removed before saving or using the data for analysis.)

```
      12345678901234567890      01 f 83 85 91      02 f 65 72
68      03 f 90 94 90      04 f 87 80 82      05 f 78 86 80
06 m 60 74 64      07 m 88 96 92      08 m 84 79 82      09
m 90 87 93      10 m 76 73 70
```

Save the data as a text file named, **grade.dat** onto a flash drive or onto the hard drive.

Notice in the above data layout that one blank space is left after each variable as specified in the code book. It is optional whether to leave a space between variable values. For example, you may choose to enter the data as following:

```
      01f838591      02f657268      03f909490      04f878082
05f788680      06m607464      07m889692
```

Whichever style (format) you choose, as long as you convey the format correctly to SPSS, it should not have any impact on the analysis. In the above layout, each case/observation has only one line (record) of data. In another situation you may have multiple records per observation.

Creating a Command file to read in your data

In many instances, you may have an external ASCII data file made available to you for analysis, just like the data, **grade.dat**, we discussed earlier. In such a situation, you do not have to enter your data again into the **Data Editor**. You can direct SPSS to read the file from the **Syntax Editor** window.

Suppose you want to read the file, **grade.dat**, into SPSS from a **Syntax Editor** window and create a system file – as you did with the previous data (sample.sav) by using the **Data Editor**. Creating a command file is a faster way to define your variables, especially if you have a large number of variables. You may create a command file using your favorite editor and then read it into a **Syntax Editor** window or open a **Syntax Editor** window and type in the command lines.

To read your already created command file into a **Syntax Editor** window

- Select **File/Open/Syntax...**
- Choose the syntax file you want to read and click **Open**

In the following example we are opening a new **Syntax Editor** window to enter the following command lines.

- Select **File/New/Syntax**

When the **Syntax Editor** window appears, type:

```
DATA LIST FILE='/Users/myuser/Desktop/grade.dat' FIXED
/ id 1-2 sex 4 (A) test1 6-7 test2 9-10 test3 12-13.
EXECUTE.          SAVE OUTFILE='/Users/myuser/Desktop/sample.sav'.
```

Click and drag with your mouse to highlight the lines entered, then click **Run** and choose **selection**. Alternatively, you can click  from the toolbar

The command file will read the specified variable values from the data file, grade.dat, on diskette, and create a system file, **sample.sav**, on diskette. Make sure you specify the pathname appropriately indicating the location of the external data file and where the newly created file is to be written. However, you do not have to save a system file to do the analysis. This means the last line is optional for data analysis. Every time you run the above lines, SPSS does create an active file stored in the computer's memory. However, for large data sets, it will save processing time if you save it as a system file and access it for analysis.

In the above command lines, **DATA LIST** defines a raw data file by assigning names and formats to each variable in the file. They can be in fixed format (values for the same variable are always entered in the same location on the same record for each case) or in freefield format (values for consecutive variables are not in particular columns but are entered one after the other, separated by blanks or commas). In our example, we used the fixed format. **FIXED** is the default if no format is specified. That is, in our example we did not have to use the **FIXED** keyword, but it is included for the sake of illustration. The only string variable in the data is **sex**, which is identified with a (A) after the variable name and column location.

We do not have any numeric variables with decimal places. SPSS assumes that decimal points are explicitly coded in the data file. If there are no decimal points, the numeric variables are assumed to be integers. To indicate noninteger values for data that have not been coded with decimal points, specify the implied number of decimal places in parentheses after the variable name and column location as in **gpa 16-18 (2)**. This means the variable **gpa** is in columns 16-18 and is recorded as, for example, 389, and it will be assigned 3.89 by SPSS.

Inline data

In the above example your data are being read from an external file, grade.dat, on drive A. Still another option is to keep the data within the command file. In such an instance you direct SPSS to read your inline data from the command lines with the **BEGIN DATA** and **END DATA** commands. In this mode of data input you will omit the **FILE** subcommand from the **DATA LIST** command. The **BEGIN DATA** command follows the **DATA LIST** command, and the **END DATA** command follows the last line of data. All procedure commands should come after the **END DATA** command, but

transformation commands can be specified before BEGIN DATA. For example, if you want to read the above data file, grade.dat, as inline data, you should modify the above command lines as following:

```
DATA LIST FREE      / id * sex (a) test1 test2 test3. BEGIN
DATA.  01 f 83 85 91  02 f 65 72 68  03 f 90 94 90  04 f 87 80
82  05 f 78 86 80  06 m 60 74 64  07 m 88 96 92  08 m 84 79 82
09 m 90 87 93  10 m 76 73 70  END DATA.  EXECUTE.  SAVE OUTFILE
=' /Users/myuser/Desktop/sample.sav' .
```

In this example, we used a FREE format data layout for illustration. Each variable value is separated by a blank space. Since we are using free format, the column specification, after each variable, is dropped. Note that the variable sex is a one-character string variable. In free field format, when you specify a string format, that format applies to all preceding variables. This means SPSS will regard both id and sex to be read with the string format. To avoid this, place an asterisk (*) after the variable id, to convey that id must be read with the default numeric format. FIXED format can be used with inline data. You may type the above lines in to a Syntax Editor window, or read in the text file with inline data into a Syntax Editor window and execute it as explained above. Keeping data inline may not be an efficient option when you have a large number of data lines.

Using Text Import Wizard to Read Text Data

Using Text Import Wizard is another way to direct SPSS to read an external ASCII data file.

Suppose you want to read the file, **grade.dat**, into SPSS from Text Import Wizard.

- Select **File/Open**
- Click Text(*.txt, *dat, *csv) for the Files of type from the Open File dialog box, choose the data file **grade.dat** on your computer, and click **Open**
- Text Import Wizard is open, follow the Step1 to Step6 in this wizard to specify how the data should be read.

In the following example we are opening **grade.dat**.

- Step 1 of 6: Check 'no' in 'Does your text file match a predefined format?' and click **Continue**.
- Step 2 of 6: Check 'Fixed width' in 'How are your variables arranged?', check 'No' in 'Are variable names included at the top of your file?' and click **Continue**.
- Step 3 of 6: Keep all default checks and click **Next**.
- Step 4 of 6: Insert breaks to specify the variables begin. Then click **Continue**.

- Step 5 of 6: This step is for specifications of variables selected in the data preview. Click V1, the column highlight. Type **id** in the Variable name dialog box, type **numeric** in the Data format dialog box. As the same way, change V2, V3, V4, V5 into **sex, test1, test2, test3**, respectively. Only **sex** is **string** variable. click **Continue**.
- Step 6 of 6: Keep all default checks and click **Done**.

The data file is read into the SPSS. We can save the data file as sample.sav.

Using the SPSS Data Editor for entering data

Suppose you want to use the SPSS for Mac OS X features for data entry. In that case, you enter data directly into the SPSS spreadsheet-like Data Editor. This is convenient if you have only a small number of variables. The first step is to enter the data into the Data Editor window by opening an SPSS for Mac OS X session. You will define your variables, variable type (e.g., numeric, alphanumeric), number of decimal places, and any other necessary attributes while you are entering the data. In this mode of data entry, you must define each variable in the Data Editor. You cannot define a group of variables (e.g., Q1 to Q10) using the Data Editor. To define a group of variables, without individually specifying them, you would use the Syntax window.

Let us start an SPSS for Mac OS X session to enter the above data set. If you are using your own Mac OS X, start Mac OS X and launch SPSS.

This opens the SPSS Data Editor window (titled Untitled). The Data Editor window contains the menu bar, which you use to open files, choose statistical procedures, create graphs, etc. When you start an SPSS session, the Data Editor window always opens first.

You are ready to enter your data once the Data Editor window appears. The first step is to enter the variable names that will appear as the top row of the data file. When you start the session, the top row of the Data Editor window contains a dimmed **var** as the title of every column, indicating that no data are present. In our sample data set, discussed above, there are five variables named earlier **asid, sex, test1, test2,** and **test3**. Let us now enter these variable names into the **Data Editor**. To define the variables, click on the **Variable View** tab at the lower left corner of the Data Editor window and:

- Type in the variable name, **id**, at the first row under the column Name.
- Press the **Tab** key to fill-in the variable's attributes with default settings.

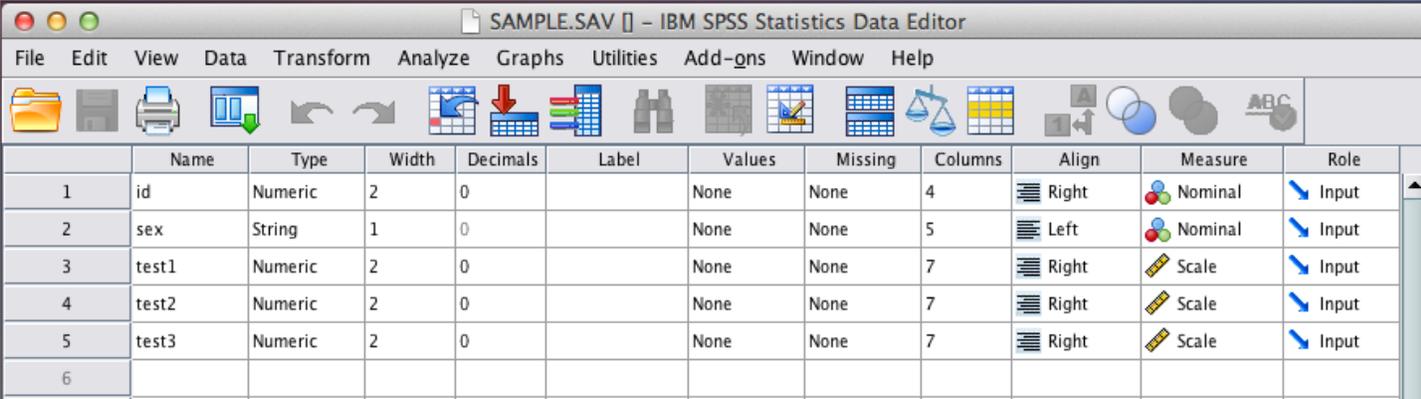
SPSS considers all variables as numeric variables by default. Since **id** is a numeric variable you do not have to redefine the variable type for **id**. However, you may want to change the current format for decimal places.

- Enter 0 for Decimals.

Now let us define the second variable, **sex**.

- Type in the variable name, **sex**, at the second row under the column Name.
- Press the **Tab** key to fill-in the variable's attributes with default settings.
- To modify the variable type, click on the  icon in the Type column.
- Select **String** by clicking on the circle to the left.

Define the remaining three numeric variables, **test1**, **test2**, and **test3**, the same way the variable **id** was defined. Once you have finished, the Variable View screen should look like:



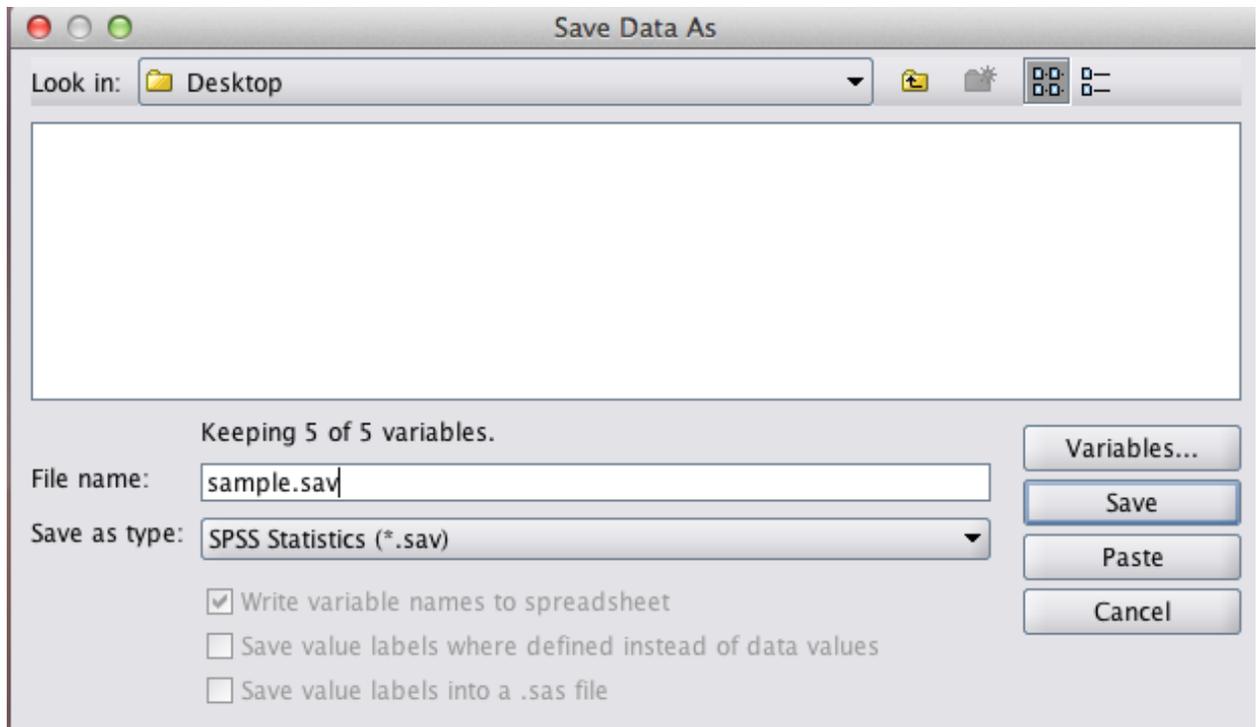
	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	id	Numeric	2	0		None	None	4	Right	Nominal	Input
2	sex	String	1	0		None	None	5	Left	Nominal	Input
3	test1	Numeric	2	0		None	None	7	Right	Scale	Input
4	test2	Numeric	2	0		None	None	7	Right	Scale	Input
5	test3	Numeric	2	0		None	None	7	Right	Scale	Input
6											

Click on the **Data View** tab. Now enter the data pressing the tab key or the right arrow key after each entry. After entering the last variable value for case number one use the arrow key to move the cursor to the beginning of the next line. Continue the process until all the data are entered.

Saving Your SPSS Data

After you have entered/read the data into the **Data Editor**, save it onto a flash drive. Those who are working from personally owned computers might want to save the file to the hard disk.

- Select **Save...** or **Save As...** from the **File** menu. A dialog box appears.



- Fill the File name box that you want to save and choose SPSS Statistics as Save as type.
- Click **Save**

The data will be saved as an SPSS format file. Note that the data file, **grade.dat**, you saved earlier and the file, **sample.sav**, you saved now are in different formats.

Even after saving the data file, the data will still be displayed on your screen. If not, select **sample.sav - SPSS Data Editor** from the **Window** menu.

Descriptive Data Analysis

Suppose that you have the data set, **sample.sav**, still displayed on your screen. If not, select **sample.sav - SPSS Data Editor** from the **Window** menu. (If you used the **Syntax Editor** window to read in your data file, **grade.dat**, then also make the **sample.sav - SPSS Data Editor** window active.)

The next step is to run some basic statistical analysis with the data you entered. The commands you use to perform statistical analysis are developed by simply pointing and clicking the mouse to appropriate menu options. This frees you from typing in your command lines.

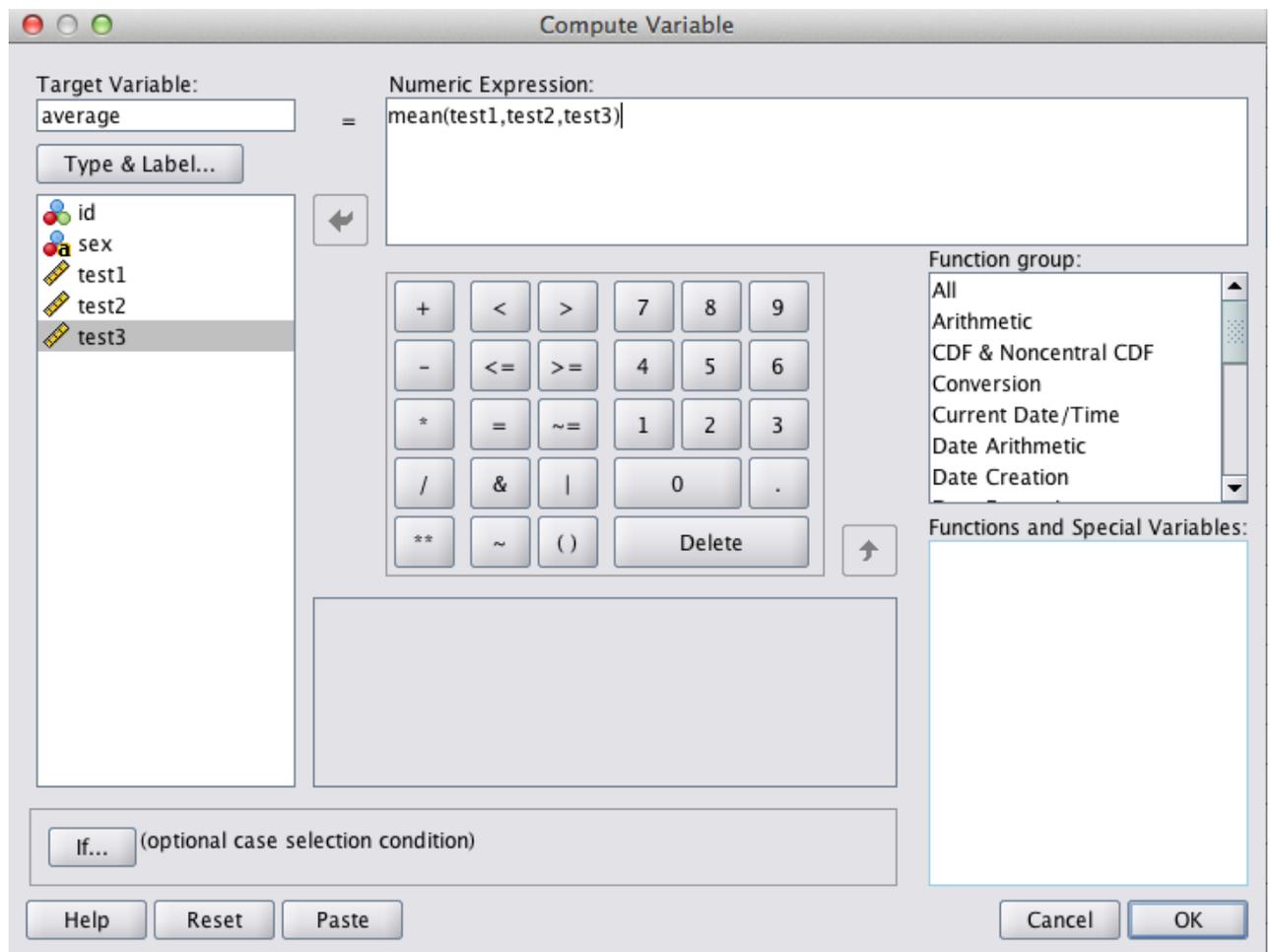
However, you may paste the command selections you made to a **Syntax Editor** window. The command lines you paste to the **Syntax Editor** window may be

edited and used for subsequent analysis, or saved for later use. Use the **Paste** pushbutton to paste your dialog box selections into a **Syntax Editor** window. If you don't have an open **Syntax Editor** window, one opens automatically the first time you paste from a dialog box. Click the **Paste** button only if you want to view the command lines you generated. Once you click the **Paste** pushbutton the dialog selections are pasted to the **Syntax Editor** window, and this window becomes active. To execute the pasted command lines, highlight them and click **run**. You can always get back to the **Data Editor** window by selecting **sample.sav - SPSS Data Editor** from the **Window** menu.

Computing a New Variable

Before computing the descriptive statistics, we want to calculate the mean score from the three tests for each student. To compute the mean score:

- Select **Compute Variable...** from the **Transform** menu. A dialog box appears



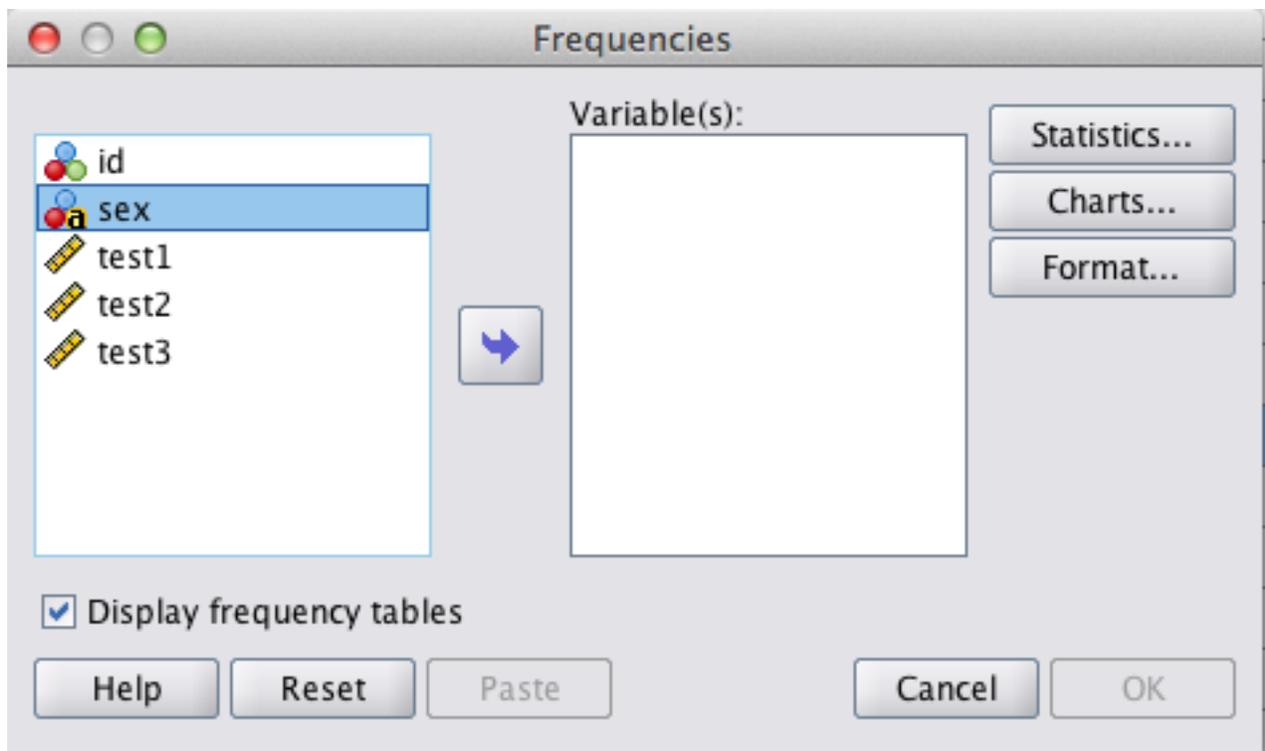
- In the box below the **Target Variable:** type in **average** as the variable name you want to assign to the mean score
- Move the pointer to the box titled **Numeric Expression:** and type: **mean (test1, test2, test3)**
- Click **OK**

A new column titled **average** will be displayed in the **Data Editor** window with the values of the mean score for each case.

FREQUENCIES

To run the FREQUENCIES procedure:

- Select **Descriptive Statistics** from **Analyze** menu
- Choose **Frequencies...**
- A dialog box appears. Names of all the variables in the data set appear on the left side of the dialog box.



- Select the variable **sex** from the list. It is highlighted.
- Click the arrow button right to the selected variable.

Now the selected variable appears in a box on the right and disappears from the left box. Note that when a variable is highlighted in the left box, the arrow button is pointed right for you to complete the selection. When a variable is highlighted in t

he right box, the arrow button is pointed left to enable you to deselect a variable (by clicking the button) if necessary. If you need additional statistics besides the frequency count, click the **Statistics...** button at the bottom of the screen. When the **Statistics...** dialog box appears, make appropriate selections and click **Continue**. In this instance, we are interested only in frequency counts.

- Click **OK**

The output appears on the Viewer screen

Frequencies

Statistics

sex

N	Valid	10
	Missing	0

sex

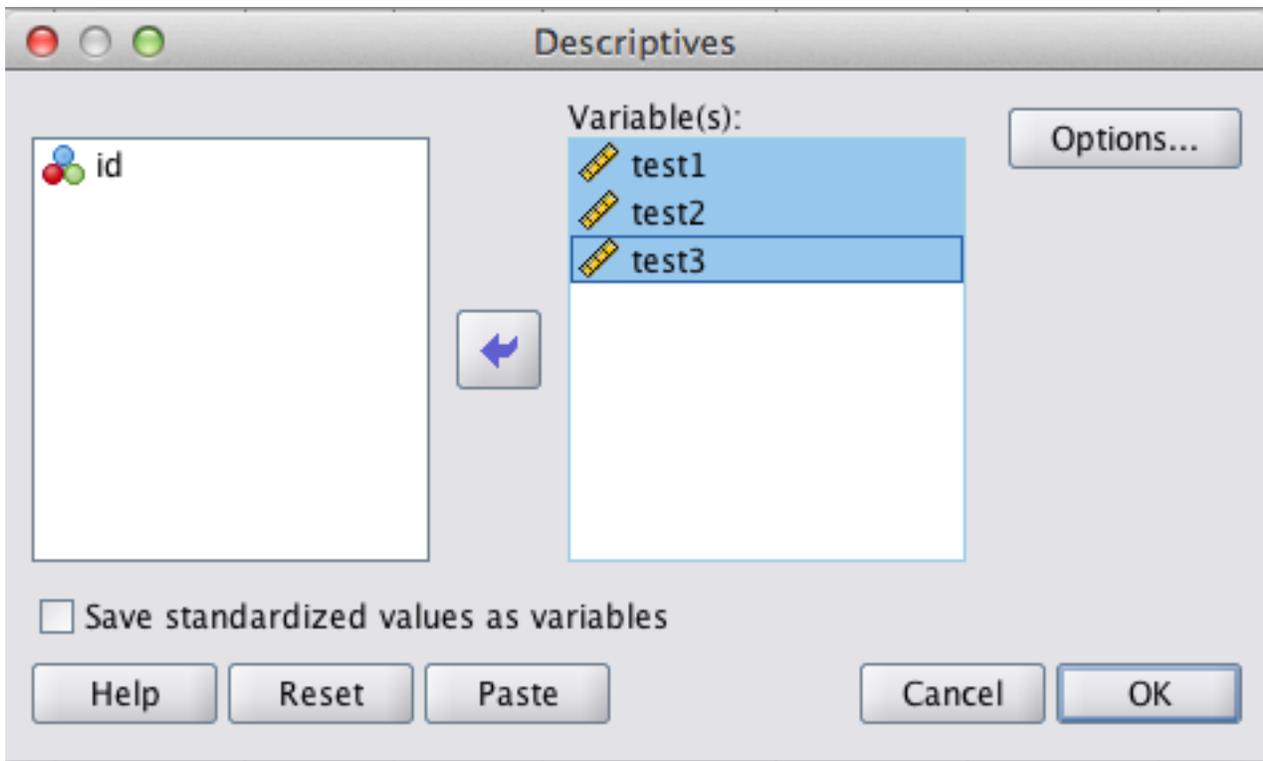
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid f	5	50.0	50.0	50.0
m	5	50.0	50.0	100.0
Total	10	100.0	100.0	

DESCRIPTIVES

Our next task is to run the DESCRIPTIVES procedure on the four continuous variables in the data set.

- Select **Descriptive Statistics** from the **Analyze** menu
- Choose **Descriptives...**

A dialog box appears. Names of all the numeric variables in the data set appear on the left side of the dialog box.



- Click the variable **average** and click the arrow button to the right of the selected variable
- Do the same thing for the variables **test1** through **test3**

Now the selected variables appear in the box on the right and disappear from the box on the left.

The mean, standard deviation, minimum, and maximum are displayed by default. The variables are displayed, by default, in the order in which you selected them. Click **Options...** for other statistics and display order.

- Click **OK**

The following output will be displayed on the Viewer screen.

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
test1	10	60.00	90.00	80.1000	10.45041
test2	10	72.00	96.00	82.6000	8.46168
test3	10	64.00	93.00	81.2000	10.68540
average	10	66.00	92.00	81.3000	9.37089
Valid N (listwise)	10				

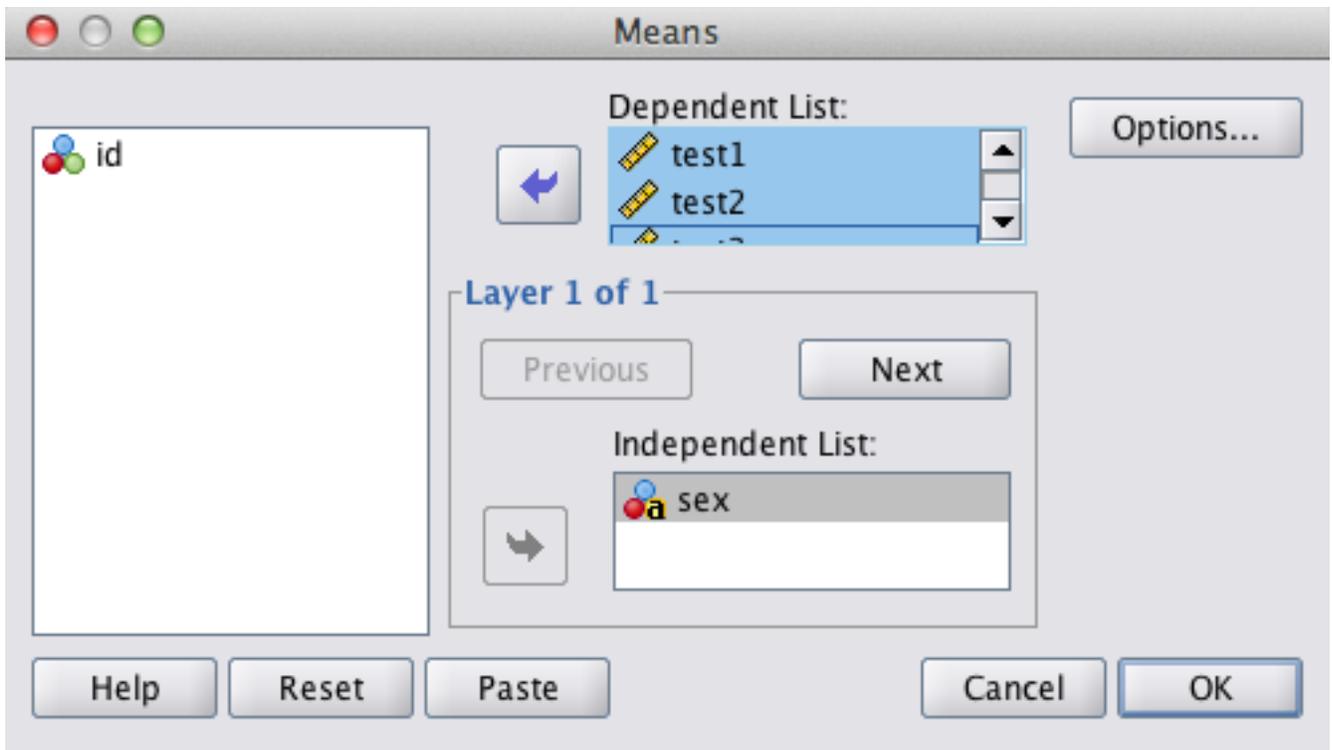
MEANS

Suppose you want to obtain the above results for males and females separately. The MEANS procedure displays means, standard deviations, and group counts for dependent variables based on grouping variables. In our data set **sex** is the grouping variable and **test1**, **test2**, **test3**, and **average** are the dependent variables. Before proceeding with the analysis let us clear the output window to better view the output from the MEANS procedure and later print it out. To do so, make the **Viewer** window active (select **Output1 - SPSS Viewer** from the **Window** menu).

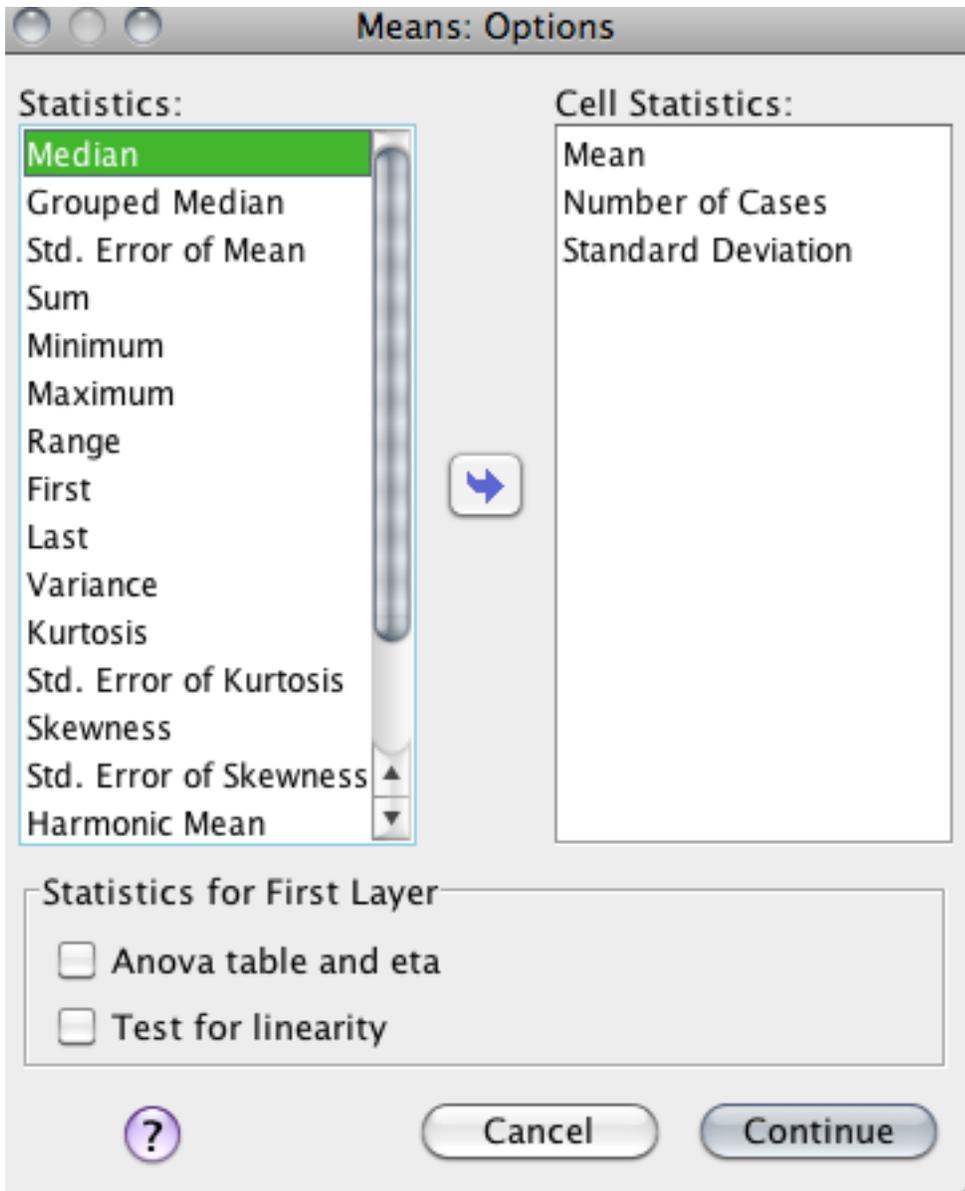
- Choose **Edit/Select All**
- Select **Edit/Delete**

To run the MEANS procedure:

- Select **Analyze/Compare Means/Means...**
- Select **test1**, **test2**, **test3**, and **average** as the dependent variables
- Select **sex** as the independent variable



- Click **Options...**



- Select **Mean**, **Number of cases**, and **Standard Deviation**. Normally these options are selected by default. If any other options are selected, deselect them by clicking them
- Click **Continue**
- Click **OK**

The output will be displayed on the Viewer screen.

Means

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
test1 * sex	10	100.0%	0	.0%	10	100.0%
test2 * sex	10	100.0%	0	.0%	10	100.0%
test3 * sex	10	100.0%	0	.0%	10	100.0%
average * sex	10	100.0%	0	.0%	10	100.0%

Report

sex		test1	test2	test3	average
f	Mean	80.6000	83.4000	82.2000	82.0667
	N	5	5	5	5
	Std. Deviation	9.81326	8.11172	9.28440	8.57451
m	Mean	79.6000	81.8000	80.2000	80.5333
	N	5	5	5	5
	Std. Deviation	12.19836	9.67988	12.96919	11.07199
Total	Mean	80.1000	82.6000	81.2000	81.3000
	N	10	10	10	10
	Std. Deviation	10.45041	8.46168	10.68540	9.37089

There may be other situations in which you want to select a specific category of cases from a grouping variable (e.g., ethnic background, socio-economic status, education). To do so, choose **Data/Select Cases...** to select the cases you want and do the analysis (e.g., from the grouping variable **educate**, select cases without a college degree). However, make sure you reset your data if you want to include all the cases for subsequent data analysis. If not, only the selected cases will appear in subsequent analysis. To reset your data choose **Data/Select Cases.../All Cases**, and click **OK**.

SPSS Output

Working with Output

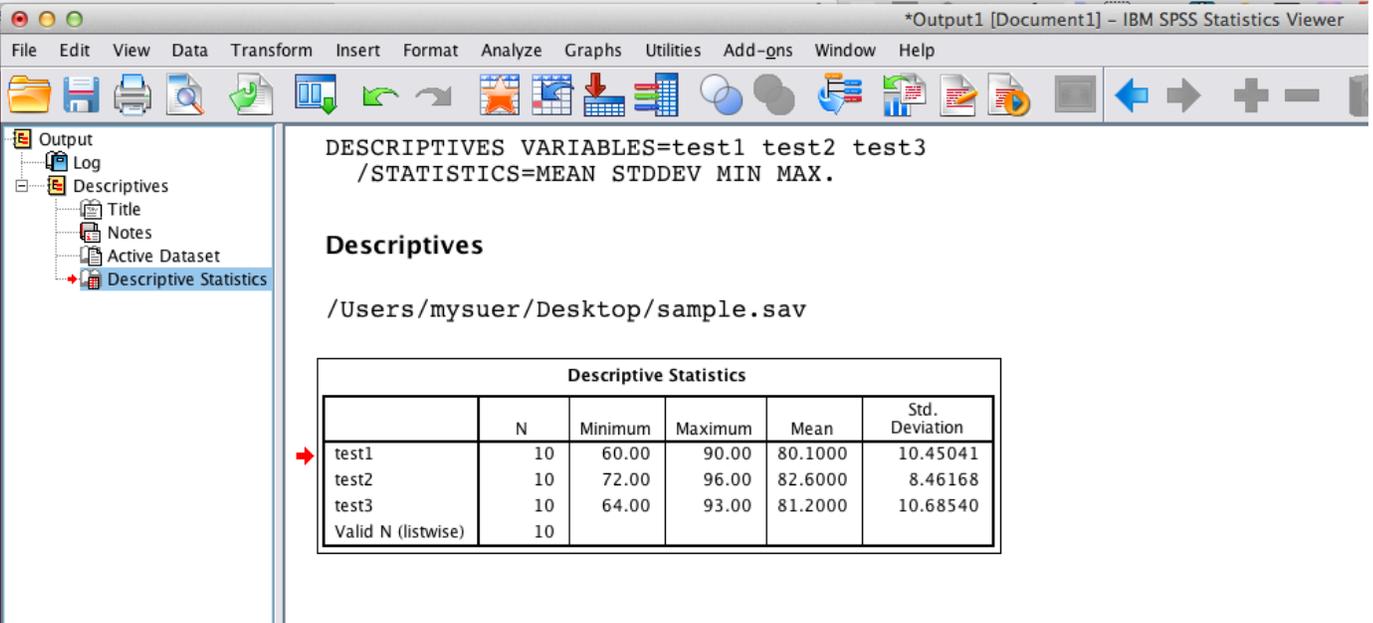
When you run a procedure in SPSS, the results are displayed in the **Viewer** window in the order in which the procedures were run. In this window, you can easily navigate to whichever part of output you want to see. You can also manipulate the output and create a document that contains precisely the output you want, arranged and formatted appropriately. You can use the **Viewer** to:

- Browse output results or show or hide selected tables and charts
- Change the display order of output by moving selected items
- Access the **Pivot Table Editor**, **Text Output Editor**, or **Chart Editor** for modifying output
- Move items between SPSS and other applications

The **Viewer** is divided into two panes. The left pane contains an outline view of the output contents. The right pane contains statistical tables, charts, and text output. You can use the scroll bars to browse the results, or you can click an item in the outline to go directly to the corresponding table or chart.

Suppose you want to copy the Descriptives table into another Mac OS application, such as a word processing program or a spreadsheet.

- Click the **Descriptives** table



The screenshot shows the IBM SPSS Statistics Viewer window. The left pane displays an outline view with 'Descriptive Statistics' selected. The right pane shows the following output:

```
DESCRIPTIVES VARIABLES=test1 test2 test3
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

/Users/mysuer/Desktop/sample.sav

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
test1	10	60.00	90.00	80.1000	10.45041
test2	10	72.00	96.00	82.6000	8.46168
test3	10	64.00	93.00	81.2000	10.68540
Valid N (listwise)	10				

- Select **Edit/Copy**
- Switch to target application
- From the menus in the target application you can choose either **Edit/Paste** or **Edit/Paste Special...**
- If you choose **Edit/Paste Special...** select the type of object you want to paste **Edit/Paste Special...** allows you to paste the SPSS output as an embedded object into the target application.

Manipulating Pivot Tables

Much of the output in SPSS is presented in tables that can be pivoted interactively. You can rearrange the rows, columns, and layers. To edit a pivot table, double-click the pivot table. Or click on the table you are going to edit, then click **Edit/Edit Content/In Separate Window**. The pivot table will be ready to edit in its own separate **Pivot Table Editor** window.

The screenshot shows the IBM SPSS Statistics Viewer interface. The menu bar includes File, Edit, View, Data, Transform, Insert, Format, Analyze, Graphs, Utilities, Add-ons, Window, and Help. The Edit menu is open, showing options like Undo, Redo, Cut, Copy, Copy Special..., Paste After, Paste Special..., Delete, Select All, Select, Find..., Find Next, Replace..., Go to Case..., Go to Variable..., Outline, and Options... The 'Edit Content' option is highlighted, and a sub-menu is open with 'In Viewer' and 'In Separate Window' options. The main window displays the following text and table:

```
DESCRIPTIVES VARIABLES=test1 test2 test3
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Descriptives

/Users/mysuer/Desktop/sample.sav

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
test1	10	60.00	90.00	80.1000	10.45041
test2	10	72.00	96.00	82.6000	8.46168
test3	10	64.00	93.00	81.2000	10.68540
Valid N (listwise)	10				

The status bar at the bottom indicates 'In Separate Window', 'IBM SPSS Statistics Processor is ready', and 'H: 1.99, W: 6.94 in'.

Further Data Analysis

So far, we've used SPSS to develop a basic idea about how SPSS for Mac OS X works. Next step is to examine a few other data analysis techniques

(CORRELATIONS, REGRESSION, T-TEST, ANOVA). Refer to the vendor documentation for the most complete information.

Sample Data Set

Now we will turn to another data set with more variables and cases. In this example, you will read an ASCII data file, `clas.dat`, created with a word processor and saved as a text file into the SPSS session. The data collected from 40 middle school students contains 26 variables including the following:

`id` (student identification number) `sex` (gender of the student) `exp` (previous computer experience in months/yrs) `school` (name of school system) `C1` thru `C10` (10 scores on the computer anxiety scale) `M1` thru `M10` (10 scores on the math anxiety scale) `mathscor` (math score for the same testing period) `compscor` (computer test score for a given testing period)

The first four variables (`id`, `sex`, `exp`, `school`) are background variables. The variable `sex` has two levels (M=male, F=female). `exp` (prior computer experience) has three levels (1=less than one year, 2=1-2 years, 3=more than 2 years), `school` (type of school system) has three levels (1=rural, 2=suburban school, 3=urban school). The next 20 variables (`C1..C10`, `M1..M10`) are Likert type responses to computer opinion and math anxiety surveys. The remaining variables (`mathscor`, `compscor`) are scores on the math test and computer test.

A copy of the [sample data file](#) is available from the Stat/Math Web home page.

Creating a Program to Read the Data File

Let us assume that the data file, `clas.dat`, is on your Desktop. The fastest way to read this data into SPSS for Mac OS X is using the Syntax window. You may open a **Syntax Editor** window (**File/New/Syntax**) and type in the following lines.

```
DATA LIST FILE='/Users/mysuer/Desktop/clas.dat' /id 1-2 sex 3
(A) exp 4 school 5 c1 to c10 6-15 m1 to m10 16-25 mathscor 26-
27 compscor 28-29. MISSING VALUES mathscor compscor (99).
RECODE c3 c5 c6 c10 m3 m7 m8 m9 (1=5) (2=4) (3=3) (4=2) (5=1).
RECODE sex ('M'=1) ('F'=2) INTO nsex. /* char var into numeric
var COMPUTE compopi=SUM (c1 TO c10). /* find sum of 10 items
using sum function COMPUTE
mathatti=m1+m2+m3+m4+m5+m6+m7+m8+m9+m10. /* adding each item
VARIABLE LABELS id 'Student Identification' sex 'Student
Gender' exp 'Yrs of Comp Experience' school 'School
Representing' mathscor 'Score in Mathematics' compscor 'Score
in Computer Science' compopi 'Total for Comp Survey' mathatti
'Total for Math Atti Scale'. VALUE LABELS sex 'M' 'Male' 'F'
```

```
'Female'/ exp 1 'Up to 1 yr' 2 '2 years' 3 '3 or more'/ school  
1 'Rural' 2 'City' 3 'Suburban'/ c1 TO c10 1 'Strongly  
Disagree' 2 'Disagree' 3 'Undecided' 4 'Agree' 5 'Strongly  
Agree'/ m1 TO m10 1 'Strongly Disagree' 2 'Disagree' 3  
'Undecided' 4 'Agree' 5 'Strongly Agree'/ nsex 1 'Male' 2  
'Female'. EXECUTE.
```

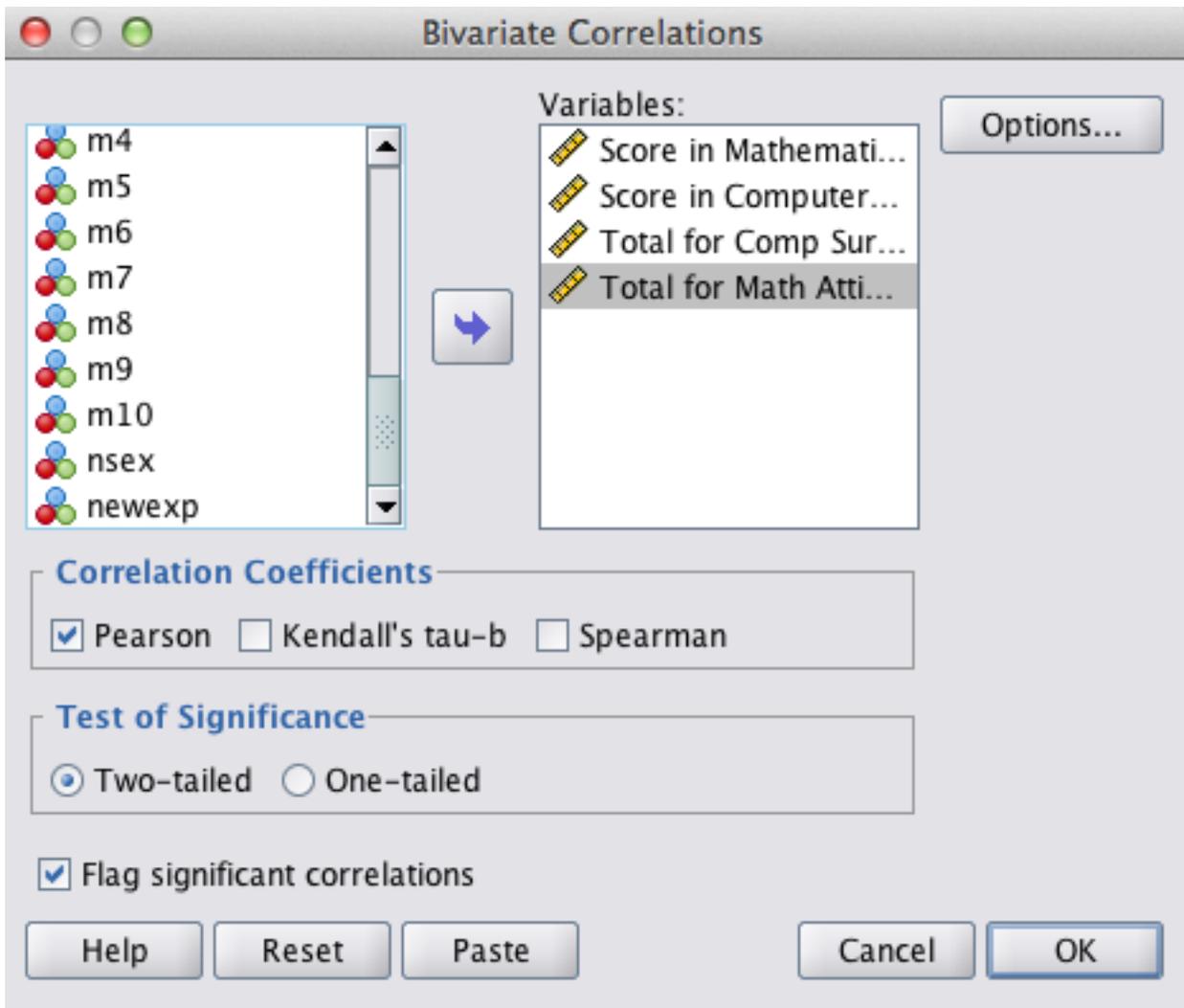
Use the mouse to highlight the command lines and click **Run**. The command lines will be executed and an active SPSS file will be created. Select **Window/Untitled - IBM SPSS Statistics Data Editor** to see the data file you just read in. Save the data file as an SPSS system file to a USB drive or to a hard drive.

- Select **File/Save**
- Type in a filename (e.g., **clas.sav**)
- A copy of the file will now be saved in SPSS format. Now you are ready for further data analysis.

Correlation analysis

A correlation analysis is performed to quantify the strength of association between two numeric variables. In the following task we will perform Pearson correlation analysis. The variables used in the analysis are compopi, mathatti, mathscor and compscor.

- Select **Analyze/Correlate/Bivariate...** This opens the **Bivariate Correlations** dialog box. The numeric variables in your data file appear on the source list on the left side of the screen.
- Select **compopi**, **compscor**, **mathatti** and **mathscor** from the list and click the arrow box. The variables will be pasted into the selection box. The options **Pearson** and **Two-tailed** are selected by default.



- Click **OK**

A symmetric matrix with Pearson correlation as given below will be displayed on the screen. Along with Pearson r , the number of cases and probability values are also displayed.

Correlations

Correlations

		Score in Mathematics	Score in Computer Science	Total for Comp Survey	Total for Math Atti Scale
Score in Mathematics	Pearson Correlation	1	.547**	.174	.637**
	Sig. (2-tailed)		.001	.302	.000
	N	37	35	37	37
Score in Computer Science	Pearson Correlation	.547**	1	.772**	.322*
	Sig. (2-tailed)	.001		.000	.049
	N	35	38	38	38
Total for Comp Survey	Pearson Correlation	.174	.772**	1	.259
	Sig. (2-tailed)	.302	.000		.107
	N	37	38	40	40
Total for Math Atti Scale	Pearson Correlation	.637**	.322*	.259	1
	Sig. (2-tailed)	.000	.049	.107	
	N	37	38	40	40

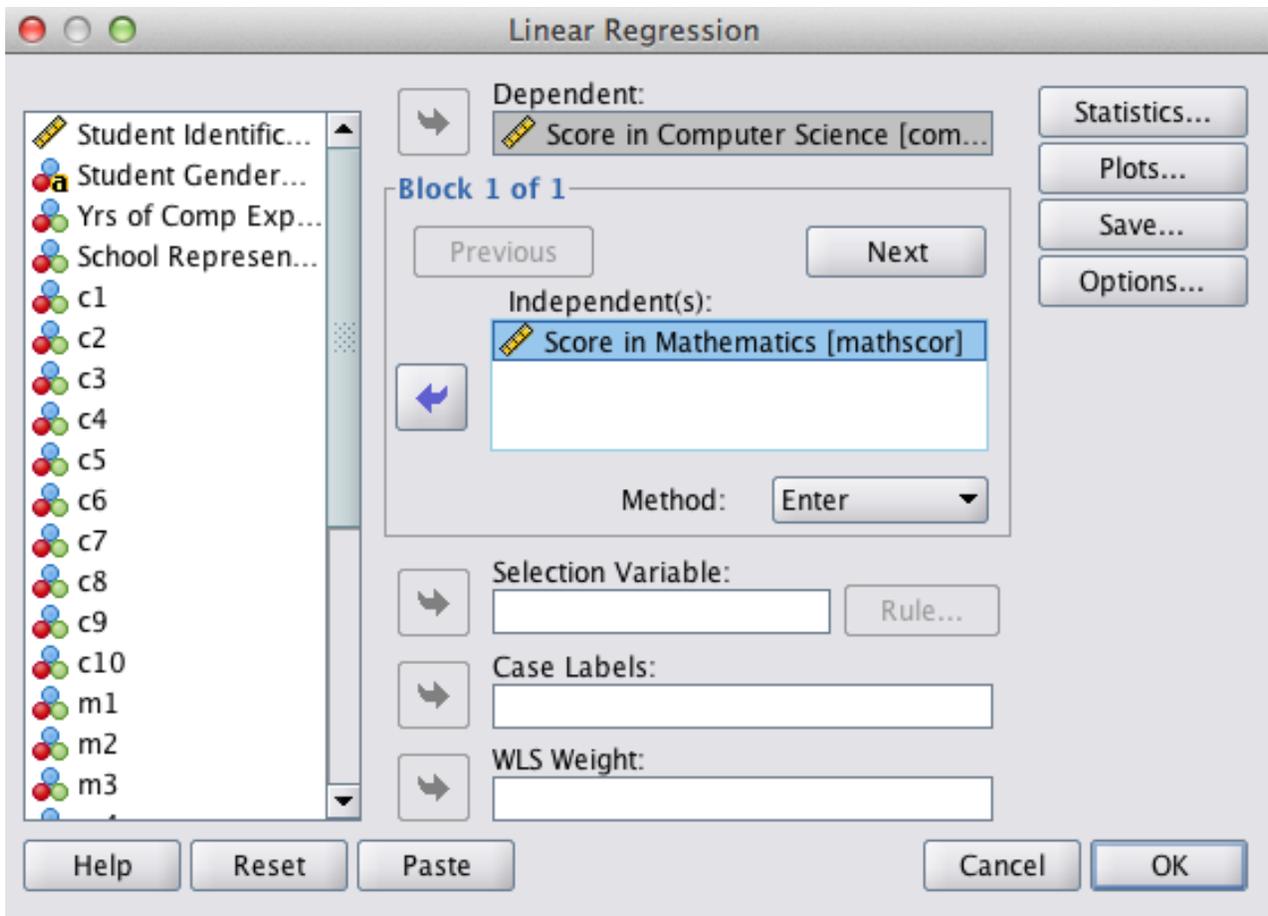
** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Simple Linear Regression

A correlation coefficient tells you that some sort of relation exists between the variables, but it does not tell you much more than that. For example, a correlation of 1.0 means that all points fall exactly on a straight line, but it says nothing about the form of the relation between the variables. When the observations are not perfectly correlated, many different lines may be drawn through the data. To select a line that describes the data, as close as possible to the points, you employ the Regression Analysis which is based on the least- squares principle. In the following task you will perform a simple regression analysis with **compscor** as the dependent variable, and **mathscor** as the independent variable.

- Choose **Analyze/Regression/Linear...** The Linear Regression dialog box appears.
- Choose **compscor** as the dependent variable
- Choose **mathscor** as the independent variable



- Click **OK**

The output will now be displayed on the screen as shown below:

➤ Regression

Variables Entered/Removed^b

Model	Variables Entered	Variables Removed	Method
1	Score in Mathematics ^a	.	Enter

a. All requested variables entered.

b. Dependent Variable: Score in Computer Science

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.547 ^a	.299	.278	5.498

a. Predictors: (Constant), Score in Mathematics

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	425.898	1	425.898	14.087	.001 ^a
	Residual	997.702	33	30.233		
	Total	1423.600	34			

a. Predictors: (Constant), Score in Mathematics

b. Dependent Variable: Score in Computer Science

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.671	5.023		3.518	.001
	Score in Mathematics	.455	.121	.547	3.753	.001

a. Dependent Variable: Score in Computer Science

T-test

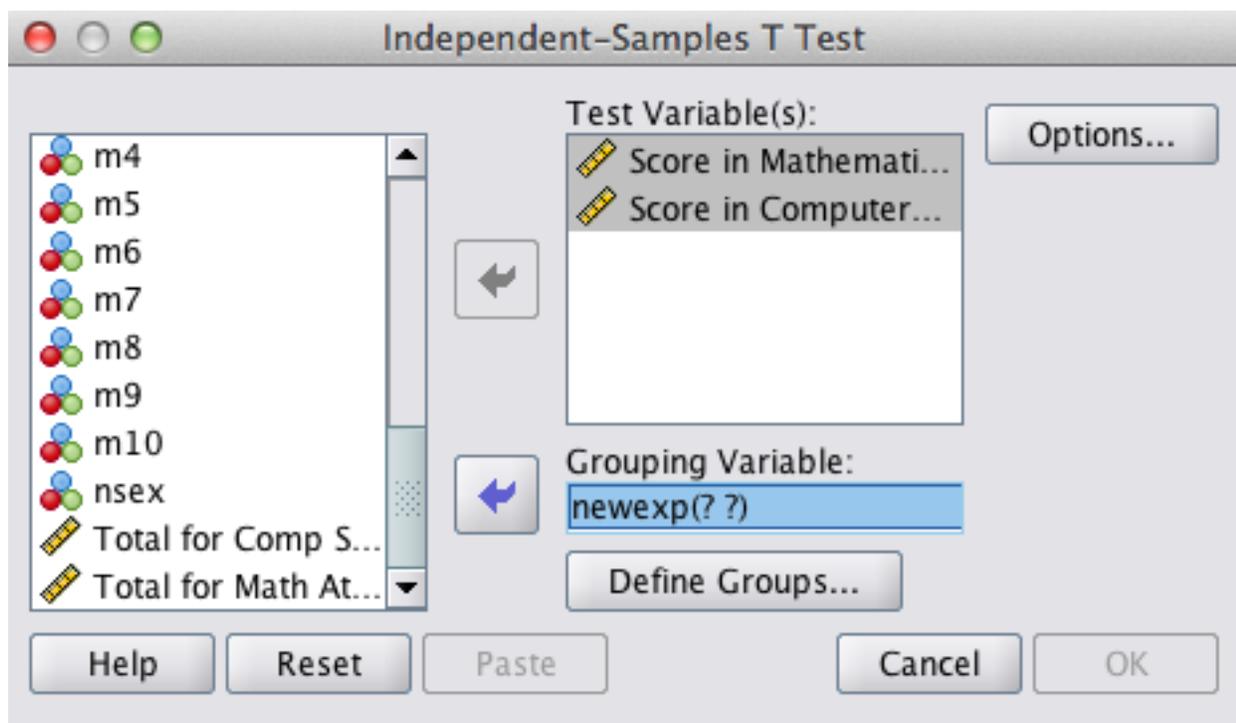
T-test is a data analysis procedure to test the hypothesis that two population means are equal. SPSS can compute independent (not related) and dependent (related) t-tests. For independent t-tests, you must have a grouping variable with exactly two values (e.g., male and female, pass and fail). The variable may either be numeric or

character. Suppose you have a grouping variable with more than two categories. You may use the RECODE command to collapse the categories into two groups. For example, a variable, `exp`, has 3 categories. You want to collapse this into two categories (1 = < 1 yr. exp, 2 = one or more yrs.) and create a new variable, `newexp`. The syntax is:

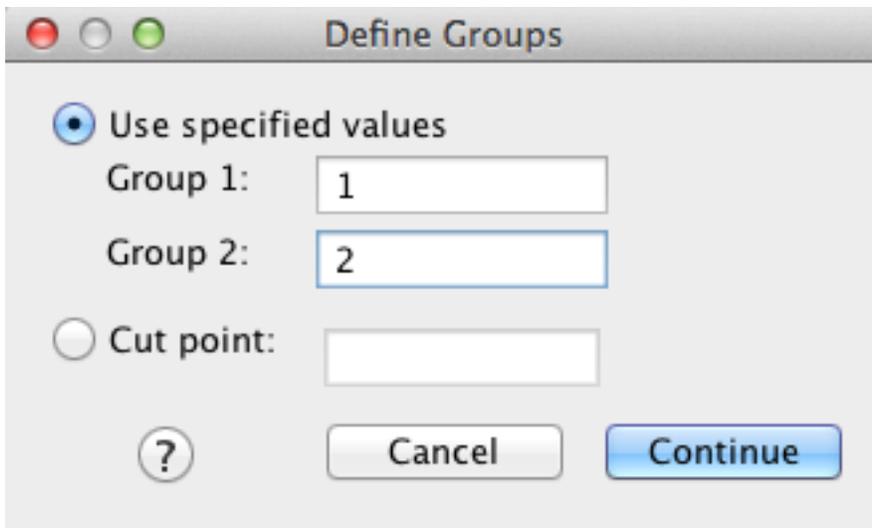
```
RECODE exp (1 = 1) (2,3 = 2) INTO newexp. EXECUTE.
```

RECODE is a powerful SPSS command for data transformation with both numeric and string variables. In the following task, we will perform an independent t-test. The test variables are `mathscor` and `compscor`, and the grouping variable is `newexp`.

- Select **Analyze/Compare Means/Independent-Samples T Test...**
- Select **compscor**, and **mathscor** as the **Test Variables**
- Select **newexp** as the **Grouping Variable**.



- Click on **Define Groups...**
- Type **1** for Group 1, and **2** for Group 2.



- Click **Continue**
- Click **OK**

The output will now be displayed on the screen as shown below:

→ **T-Test**

	newexp	N	Mean	Std. Deviation	Std. Error Mean
Score in Mathematics	1.00	14	38.71	6.592	1.762
	2.00	23	41.83	8.015	1.671
Score in Computer Science	1.00	14	37.07	6.569	1.756
	2.00	24	35.29	6.623	1.352

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Score in Mathematics	Equal variances assumed	.334	.567	-1.221	35	.230	-3.112	2.548	-8.285	2.062
	Equal variances not assumed			-1.281	31.738	.209	-3.112	2.428	-8.060	1.836
Score in Computer Science	Equal variances assumed	.023	.881	.801	36	.428	1.780	2.221	-2.724	6.284
	Equal variances not assumed			.803	27.521	.429	1.780	2.216	-2.763	6.322

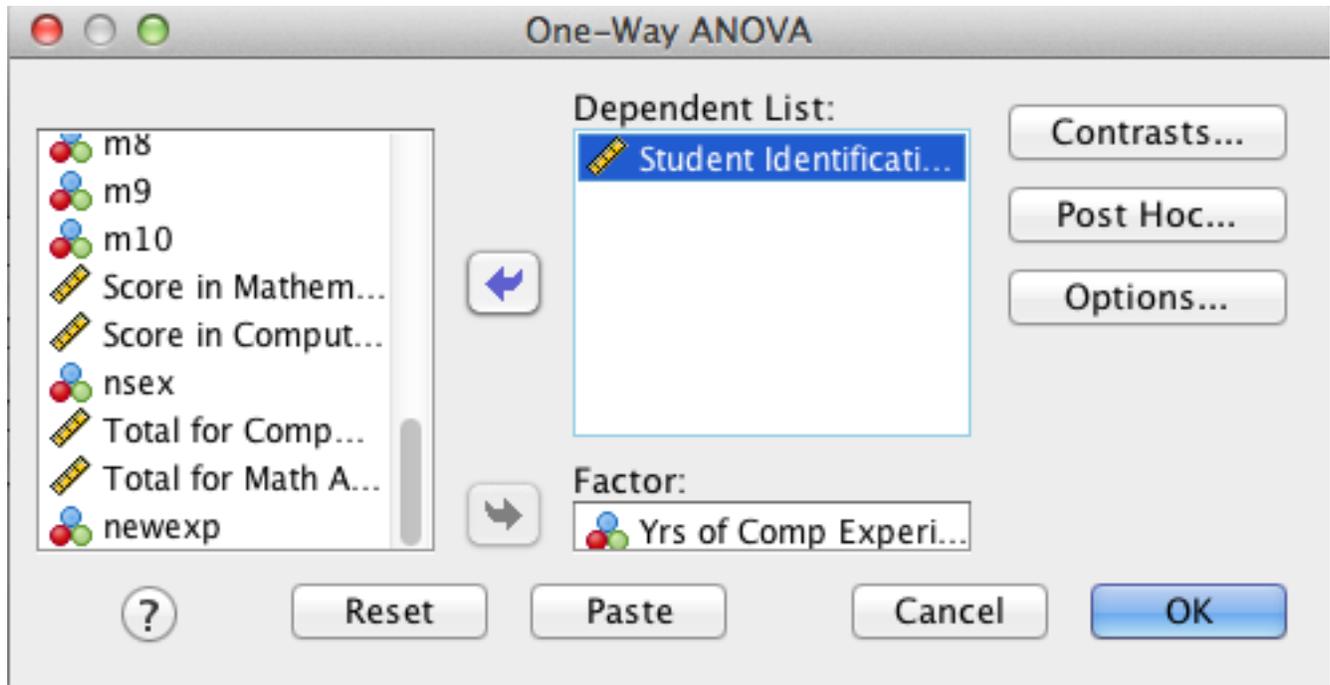
One-way Analysis of Variance

The statistical technique used to test the null hypothesis that several population means are equal is called analysis of variance. It is called that because it examines the variability in the sample and, based on the variability, it determines whether there is a reason to believe the population means are not equal. The statistical test for the null hypothesis that all of the groups have the same mean in the population is based on computing the ratio of within and between group variability estimates, called the F statistic. A significant F value only tells you that the population means are probably not

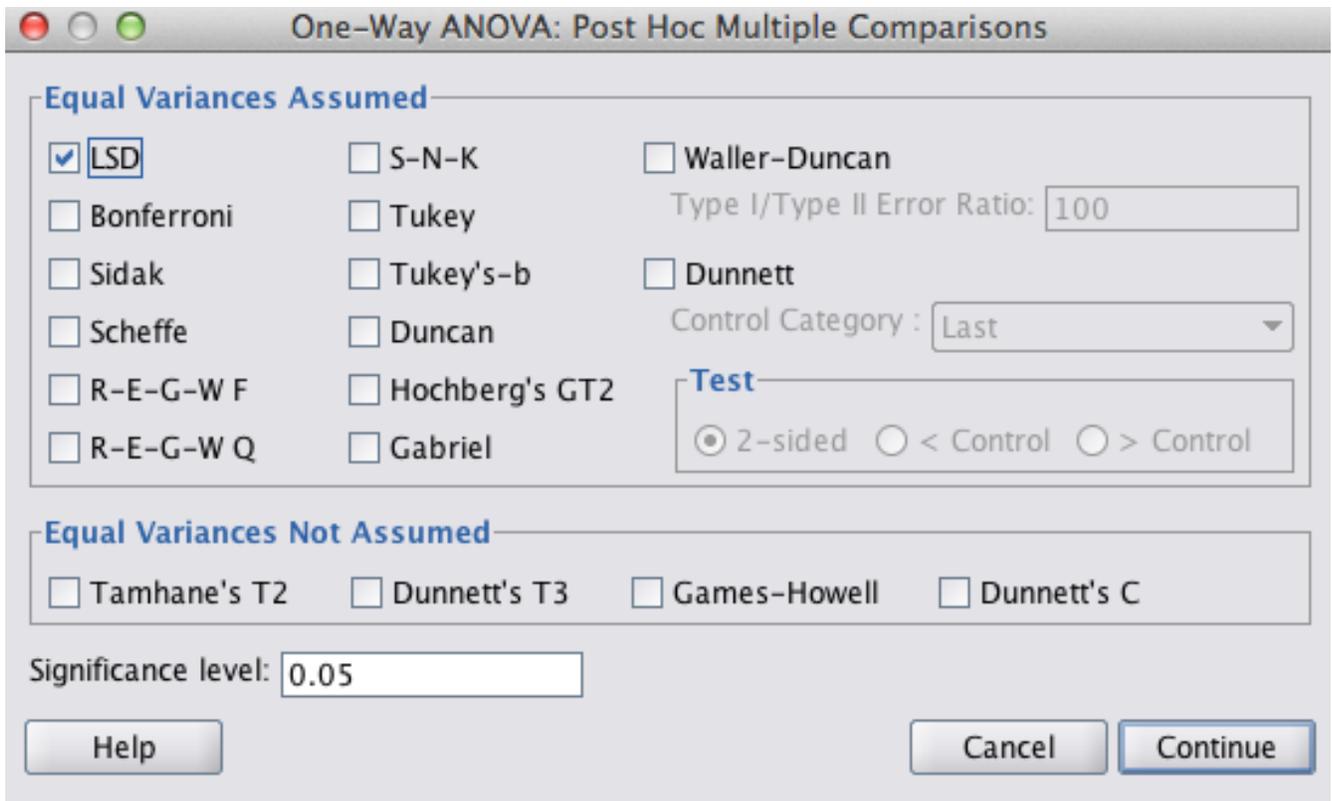
all equal. It does not tell you which pairs of groups appear to have different means. To pinpoint exactly where the differences are, multiple comparisons may be performed.

In the following exercise you will perform a One-Way ANOVA with **compopi** as the dependent variable, and **exp** as the factor variable.

- Select **Analyze/Compare Means/One-Way ANOVA...**
- Select **compopi** for the dependent variable
- Select **exp** for the factor variable



- Click **Post Hoc...**
- Select **LSD**(Least-significant difference)



- Click **Continue**
- Click **Options...**
- Select **descriptive**
- Click **Continue**
- Click **OK**

The output will be displayed on the screen as shown below:

➔ Oneway

Descriptives

Total for Comp Survey

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Up to 1 yr	15	28.4667	10.20411	2.63469	22.8158	34.1175	15.00	44.00
2 years	14	24.8571	11.60807	3.10239	18.1548	31.5594	13.00	45.00
3 or more	11	31.0909	13.14880	3.96451	22.2574	39.9244	15.00	46.00
Total	40	27.9250	11.53009	1.82307	24.2375	31.6125	13.00	46.00

ANOVA

Total for Comp Survey

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	246.418	2	123.209	.923	.406
Within Groups	4938.357	37	133.469		
Total	5184.775	39			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Total for Comp Survey

LSD

(I) Yrs of Comp Experience	(J) Yrs of Comp Experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Up to 1 yr	2 years	3.60952	4.29319	.406	-5.0893	12.3083
	3 or more	-2.62424	4.58601	.571	-11.9164	6.6679
2 years	Up to 1 yr	-3.60952	4.29319	.406	-12.3083	5.0893
	3 or more	-6.23377	4.65479	.189	-15.6653	3.1977
3 or more	Up to 1 yr	2.62424	4.58601	.571	-6.6679	11.9164
	2 years	6.23377	4.65479	.189	-3.1977	15.6653

Further Reading

The material covered in this document illustrates some of the basic features of SPSS 20 for Mac OS X. Examining additional features of SPSS for Mac OS X is beyond the scope of this document. For further help, refer to SPSS 20 documents. If you need assistance in using SPSS for Mac OS X, contact the UITS Stat/Math Center.

The documents for SPSS 20 are:

- SPSS Brief Guide 20
- SPSS Statistics Base 20
- SPSS Command Syntax Reference 20
- SPSS Advanced Statistics 20
- SPSS Regression 20