



DataTool 1.0

Free Application for calculating Tukey's Control
Chart Confidence Limits and Autocorrelation-
Adjusted Non-Parametric Control Chart
Confidence Limits

For Windows and Macintosh

User's Guide

Software developed by Jeffrey J. Borckardt, Ph.D. at the Medical
University of South Carolina using RealBasic 5.5.3 on the Macintosh
Platform (Copyright © 2006, Jeffrey J. Borckardt)

About this program

DataTool 1.0 allows users to copy a column of numeric data from most spreadsheet software packages (e.g., Microsoft Excel) and quickly calculate the median, mean, 25th and 75th percentiles, fourth-spread, autocorrelation estimate, upper and lower confidence limits using Tukey's Control Chart Technique and Autocorrelation-Adjusted confidence limits. The program then allows for easy export back into most spreadsheet packages for graphing and/or further analysis.

Program operation

This program is designed to be a functional stand-alone data-editor that does not require any direct integration or installation into existing software, and does not involve the use of any Macros or other files that are easily corrupted. This design prevents software conflicts and corruption of data files and program files and allows users to continue to work with programs they are most comfortable with. Successful use of this program involves following a few simple steps outlined in this guide. The overall operation scheme is as follows:

STEP-1

Open a spreadsheet datafile or type data into your preferred spreadsheet program (e.g., Microsoft Excel).

STEP-2

COPY this numeric data to the computer clipboard using Cntrl-C or "Copy" from the program's "Edit" menu.

STEP-3

Open DataTool and import this data, by clicking "Import".

STEP-4

Process the data by clicking "Process".

STEP-4a

View, print and/or save the data properties summary and determine whether you want to apply the autocorrelation-correction to the data.

STEP-5

Choose which columns of processed data you wish to export and then click "Export"

STEP-6

Open your spreadsheet file and paste the processed data into the file by using Cntrl-V or "Paste" from the "Edit" menu.

Data and Spreadsheet Software Requirements

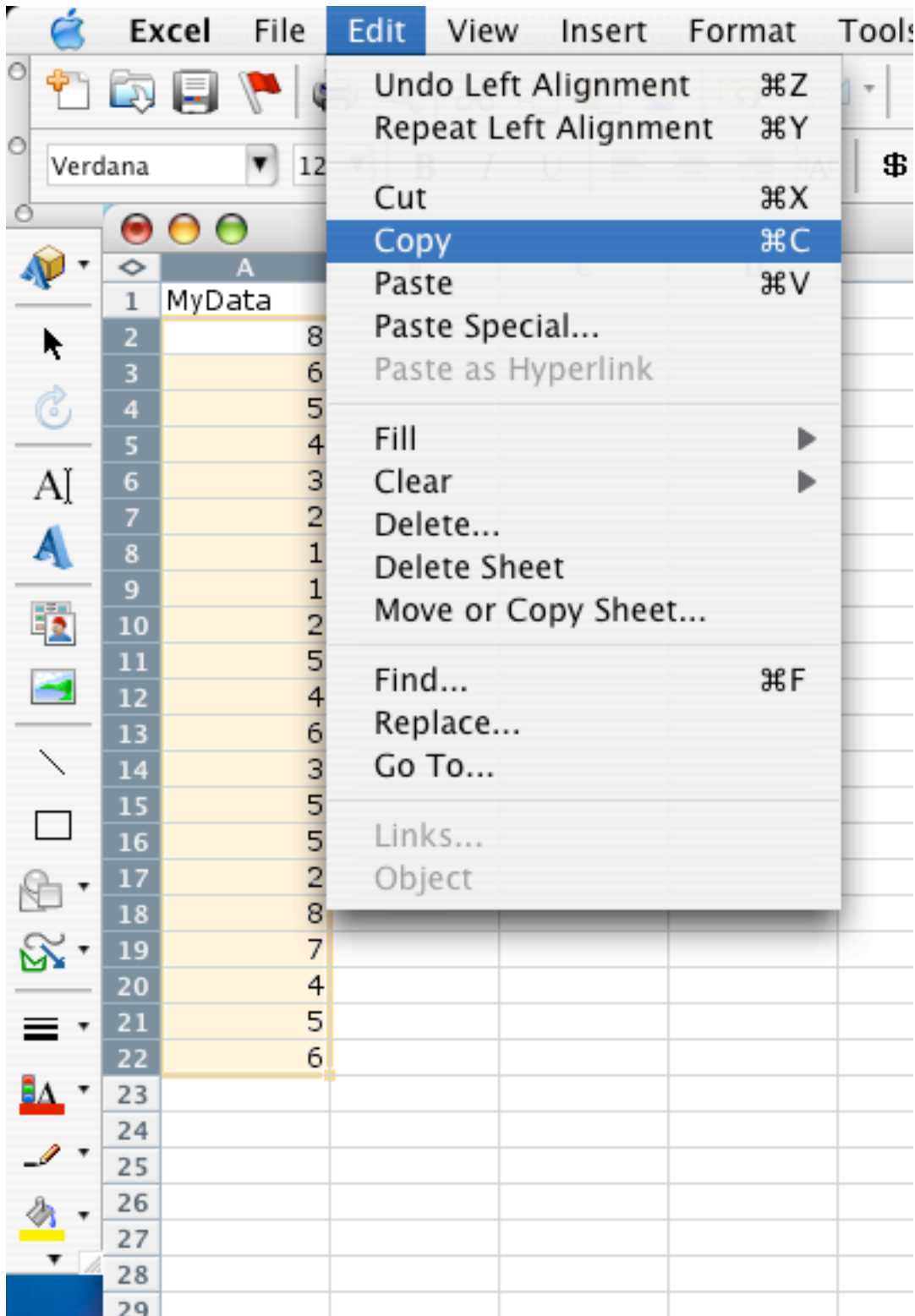
Any spreadsheet software that uses tab-delimited text format for copying and pasting data from the clipboard should work with DataTool1.0. These include but are not limited to Microsoft Excel and SPSS. The data that is copied from the spreadsheet program should be numeric data and it SHOULD NOT contain any text labels.

STEP - 1 : Selecting the original data

	A	B	C	D	E
1	MyData				
2	8				
3	6				
4	5				
5	4				
6	3				
7	2				
8	1				
9	1				
10	2				
11	5				
12	4				
13	6				
14	3				
15	5				
16	5				
17	2				
18	8				
19	7				
20	4				
21	5				
22	6				
23					
24					
25					
26					
27					

Select a single column of data in your spreadsheet program by dragging the mouse over the data of interest. Try to avoid selecting non-numeric information (column headings or names). Only select numbers.

STEP - 2 : Copying the original data



"Copy" the data to the clipboard by pressing Ctrl-C (windows) or Command-C (macintosh). Or you can select "Copy" from the "Edit" menu in the spreadsheet program (see above)

STEP - 4 : Importing data into DataTool

The screenshot shows the 'Tukey Control Chart' application window. At the top, a message states: 'Data loaded successfully from the clipboard. Click 'Process' to continue.' Below this message are four buttons: 'Import', 'Process', 'Export', and 'Quit'. On the left side, there is a data table with columns labeled 'EXPORT', 'EXPORT', 'EXPORT', 'EXPORT', and 'EXPORT'. The first column is labeled 'N' and the second is 'DATA'. The data rows are as follows:

N	DATA	EXPORT	EXPORT	EXPORT	EXPORT
1	8				
2	6				
3	5				
4	4				
5	3				
6	2				
7	1				
8	1				
9	2				
10	5				
11	4				
12	6				
13	3				
14	5				
15	5				
16	2				
17	8				
18	7				
19	4				
20	5				
21	6				

On the right side, there is a 'Console Window' with the text 'Data Properties: NONE'. At the bottom of the window, there is a checkbox labeled 'Autocorr. Correct' which is checked, and two buttons labeled 'Print' and 'Save'. The footer of the application contains the text: 'Non-Parametric Control Chart Data Management Tool Medical University of South Carolina Jeffrey J. Borckardt, Ph.D.'

Click "Import" and the data should appear in the DataTool window.

DataTool automatically makes a column called "N" which is the number of each value in the data column. If the data was imported successfully, DataTool will tell you in the upper-left textfield. If there was a problem importing the data, DataTool will produce a red-colored error message with a suggestion for how to fix the problem.

STEP - 5 : Processing data and saving data properties

Tukey Control Chart

Data processed. Chose which columns to export by clicking on the green row in the data field below. Then click 'Export' to continue.

EXPORT	EXPORT	EXPORT	EXPORT	EXPORT
N	DATA	MEDIAN	Adj-LCL	Adj-UCL
1	8	5	-2.175846	11.17585
2	6	5	-2.175846	11.17585
3	5	5	-2.175846	11.17585
4	4	5	-2.175846	11.17585
5	3	5	-2.175846	11.17585
6	2	5	-2.175846	11.17585
7	1	5	-2.175846	11.17585
8	1	5	-2.175846	11.17585
9	2	5	-2.175846	11.17585
10	5	5	-2.175846	11.17585
11	4	5	-2.175846	11.17585
12	6	5	-2.175846	11.17585
13	3	5	-2.175846	11.17585
14	5	5	-2.175846	11.17585
15	5	5	-2.175846	11.17585
16	2	5	-2.175846	11.17585
17	8	5	-2.175846	11.17585
18	7	5	-2.175846	11.17585
19	4	5	-2.175846	11.17585
20	5	5	-2.175846	11.17585
21	6	5	-2.175846	11.17585

Console Window:

Thursday, January 12, 2006 11:54 AM
Number of data-points = 21

DESCRIPTIVE INFORMATION
Mean = 4.380952
Median = 5
25th %ile = 3
75th %ile = 6

TUKEY'S CONTROL CHART PROPERTIES
Spread = 3
Tukey UCL = 10.5
Tukey LCL = -1.5

AUTOCORRELATION INFORMATION
Estimated Lag-1 Autocorrelation = 0.3875411
AR-Square = 0.1501881

AR-ADJUSTED CONTROL CHART PROPERTIES
Adjusted spread = 3.450564
Adjusted UCL = 11.17585
Adjusted LCL = -2.175846

Autocorr. Correct

Non-Parametric Control Chart
Medical University of South Carolina

Data Management Tool
Jeffrey J. Borckardt, Ph.D.

Click on "Process" and DataTool will calculate many relevant data properties and display them in the "Console Window". The contents of the Console Window can be saved or printed by pressing the appropriate button on the bottom right of the screen. The format of the saved data is "text-only". This format can be read with most word-processing software (MSWord, WordPad, WordPerfect, SimpleText), however, there appears to be a problem when NotePad (Windows) is used to open these files. It does not read line breaks properly thus

NotePad is not recommended for reading these text-files.

Note that you can choose whether you wish to use traditional Tukey control-limits or autocorrelation-adjusted control limits by checking or unchecking the "Autocorr. Correct" button under the Console

Window.

STEP - 6 : Exporting data from DataTool

The screenshot shows the 'Tukey Control Chart' application window. At the top, a message states: 'Data was exported to the clipboard. You can now paste the processed data back into a spreadsheet program.' Below this message are four buttons: 'Import', 'Process', 'Export', and 'Quit'. The main area is divided into two panes. The left pane contains a table with 21 rows and 5 columns. The first column is labeled 'N' and the other four are 'DATA', 'MEDIAN', 'Adj-LCL', and 'Adj-UCL'. The 'EXPORT' label is visible above each of the four data columns. The right pane is titled 'Console Window:' and displays the following information:

Thursday, January 12, 2006 11:54 AM
Number of data-points = 21

DESCRIPTIVE INFORMATION
Mean = 4.380952
Median = 5
25th %ile = 3
75th %ile = 6

TUKEY'S CONTROL CHART PROPERTIES
Spread = 3
Tukey UCL = 10.5
Tukey LCL = -1.5

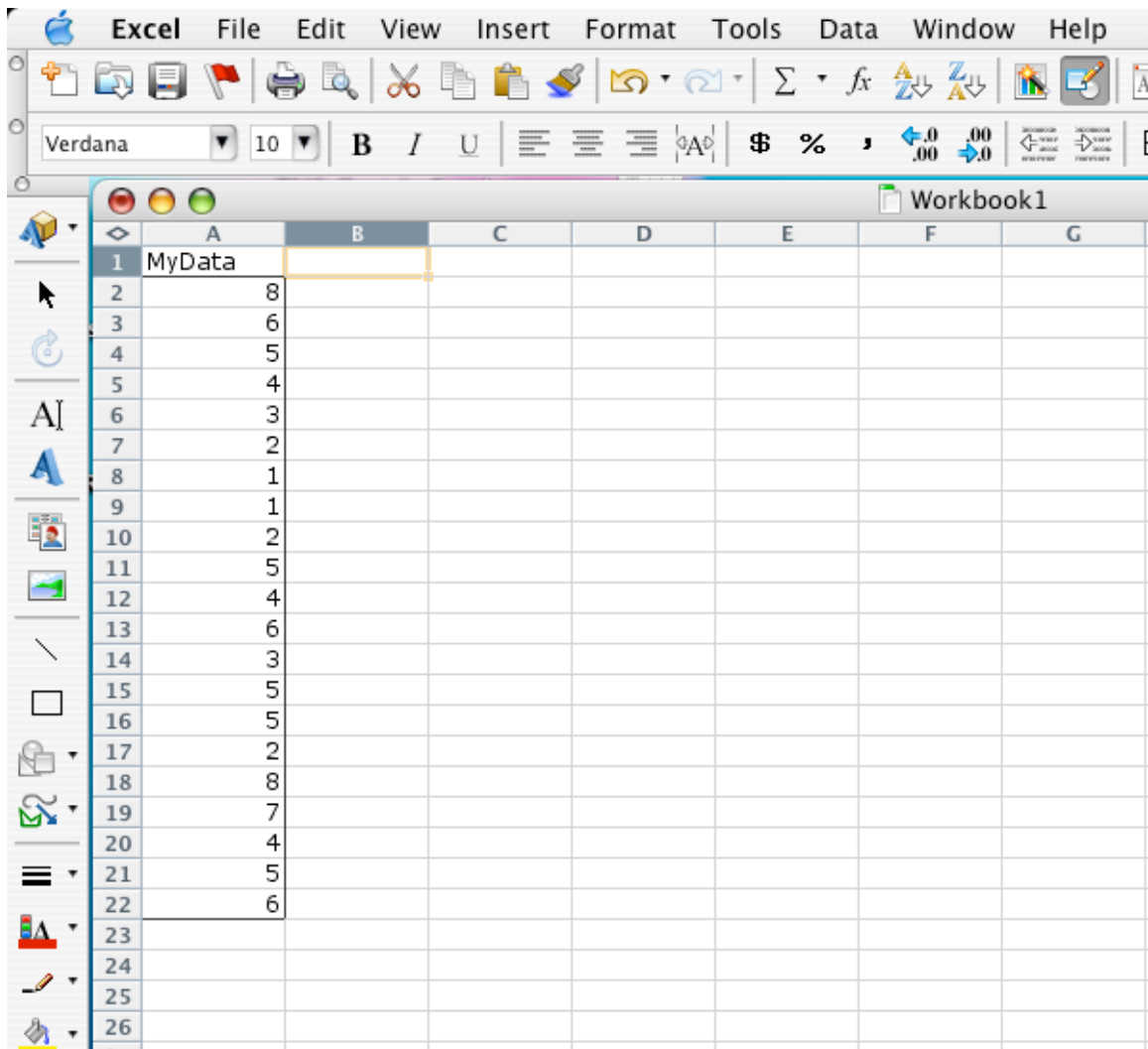
AUTOCORRELATION INFORMATION
Estimated Lag-1 Autocorrelation = 0.3875411
AR-Square = 0.1501881

AR-ADJUSTED CONTROL CHART PROPERTIES
Adjusted spread = 3.450564
Adjusted UCL = 11.17585
Adjusted LCL = -2.175846

N	DATA	MEDIAN	Adj-LCL	Adj-UCL
1	8	5	-2.175846	11.17585
2	6	5	-2.175846	11.17585
3	5	5	-2.175846	11.17585
4	4	5	-2.175846	11.17585
5	3	5	-2.175846	11.17585
6	2	5	-2.175846	11.17585
7	1	5	-2.175846	11.17585
8	1	5	-2.175846	11.17585
9	2	5	-2.175846	11.17585
10	5	5	-2.175846	11.17585
11	4	5	-2.175846	11.17585
12	6	5	-2.175846	11.17585
13	3	5	-2.175846	11.17585
14	5	5	-2.175846	11.17585
15	5	5	-2.175846	11.17585
16	2	5	-2.175846	11.17585
17	8	5	-2.175846	11.17585
18	7	5	-2.175846	11.17585
19	4	5	-2.175846	11.17585
20	5	5	-2.175846	11.17585
21	6	5	-2.175846	11.17585

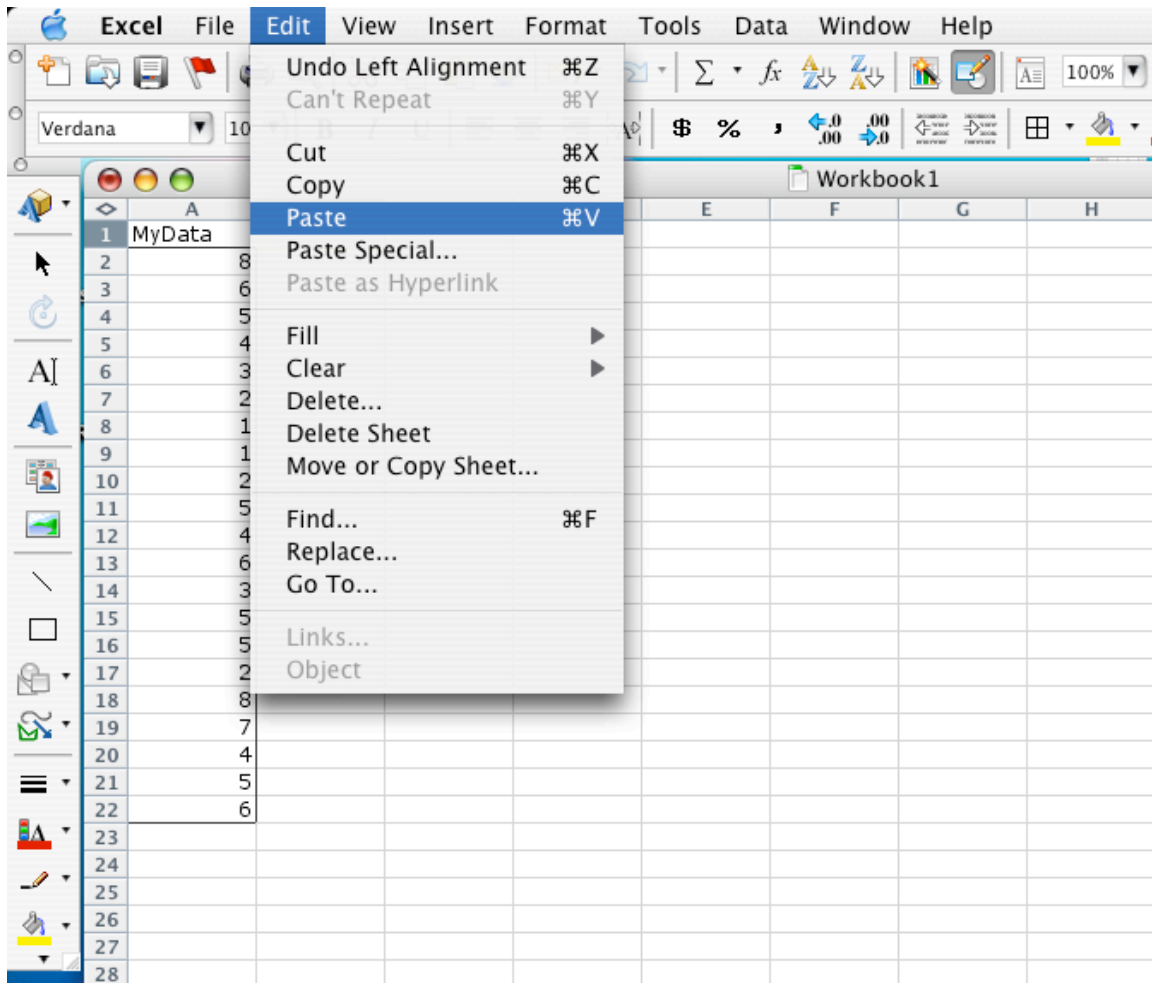
You can choose which columns of data you want to export to your spreadsheet program by clicking on the green bar above each column of data. If the bar displays "Export", the data in that column will be exported to the clipboard, otherwise it will be missing. In the picture above, all of the columns will be exported except for "N" as the export-function has been turned-off. Once you have selected which columns you want to export, click the "Export" button.

STEP - 7 : Putting data back into the spreadsheet



Open your spreadsheet program and select a cell into which you want to paste the block of new data.

STEP - 8 : Pasting the new data into spreadsheet



Press Ctrl-V (windows) or Command-V (macintosh) to paste the data into the spreadsheet file (or select "Paste" from the "Edit" menu). Note that DataTool exports the column headings (titles) as well as the data.

The screenshot shows a Microsoft Excel spreadsheet with the following data:

	A	B	C	D	E	F
1	MyData	DATA	MEDIAN	Adj-LCL	Adj-UCL	
2	8	8	5	-2.175846	11.17585	
3	6	6	5	-2.175846	11.17585	
4	5	5	5	-2.175846	11.17585	
5	4	4	5	-2.175846	11.17585	
6	3	3	5	-2.175846	11.17585	
7	2	2	5	-2.175846	11.17585	
8	1	1	5	-2.175846	11.17585	
9	1	1	5	-2.175846	11.17585	
10	2	2	5	-2.175846	11.17585	
11	5	5	5	-2.175846	11.17585	
12	4	4	5	-2.175846	11.17585	
13	6	6	5	-2.175846	11.17585	
14	3	3	5	-2.175846	11.17585	
15	5	5	5	-2.175846	11.17585	
16	5	5	5	-2.175846	11.17585	
17	2	2	5	-2.175846	11.17585	
18	8	8	5	-2.175846	11.17585	
19	7	7	5	-2.175846	11.17585	
20	4	4	5	-2.175846	11.17585	
21	5	5	5	-2.175846	11.17585	
22	6	6	5	-2.175846	11.17585	
23						
24						
25						

The data you exported from DataTool will now appear your spreadsheet program. Note that DataTool exports the column headings (titles) as well as the data.

The screenshot shows the Microsoft Excel interface with a data table and the Chart Wizard dialog box. The data table is as follows:

	A	B	C	D	E	
1	MyData	DATA	MEDIAN	Adj-LCL	Adj-UCL	
2		8	8	5	-2.175846	11.17585
3		6	6	5	-2.175846	11.17585
4		5	5	5	-2.175846	11.17585
5		4	4	5	-2.175846	11.17585
6		3	3	5	-2.175846	11.17585
7		2	2	5	-2.175846	11.17585
8		1	1	5	-2.175846	11.17585
9		1	1	5	-2.175846	11.17585
10		2	2	5	-2.175846	11.17585
11		5	5	5	-2.175846	11.17585
12		4	4	5	-2.175846	11.17585
13		6	6	5	-2.175846	11.17585
14		3	3	5	-2.175846	11.17585
15		5	5	5	-2.175846	11.17585
16		5	5	5	-2.175846	11.17585
17		2	2	5	-2.175846	11.17585
18		8	8	5	-2.175846	11.17585
19		7	7	5	-2.175846	11.17585
20		4	4	5	-2.175846	11.17585
21		5	5	5	-2.175846	11.17585
22		6	6	5	-2.175846	11.17585

The Chart Wizard dialog box is titled "Chart Wizard - Step 2 of 4 - Chart Source Data". It shows a preview of a line chart with three data series. The "Data Range" is set to "=Sheet1!\$B\$2:\$E\$22". The "Series in:" options are "Rows" and "Columns", with "Columns" selected.

Now you can select the data and use the graphing functions of the spreadsheet program