Tutorials and worked examples for simulation, curve fitting, statistical analysis, and plotting.
http://www.simfit.org.uk

Example 1

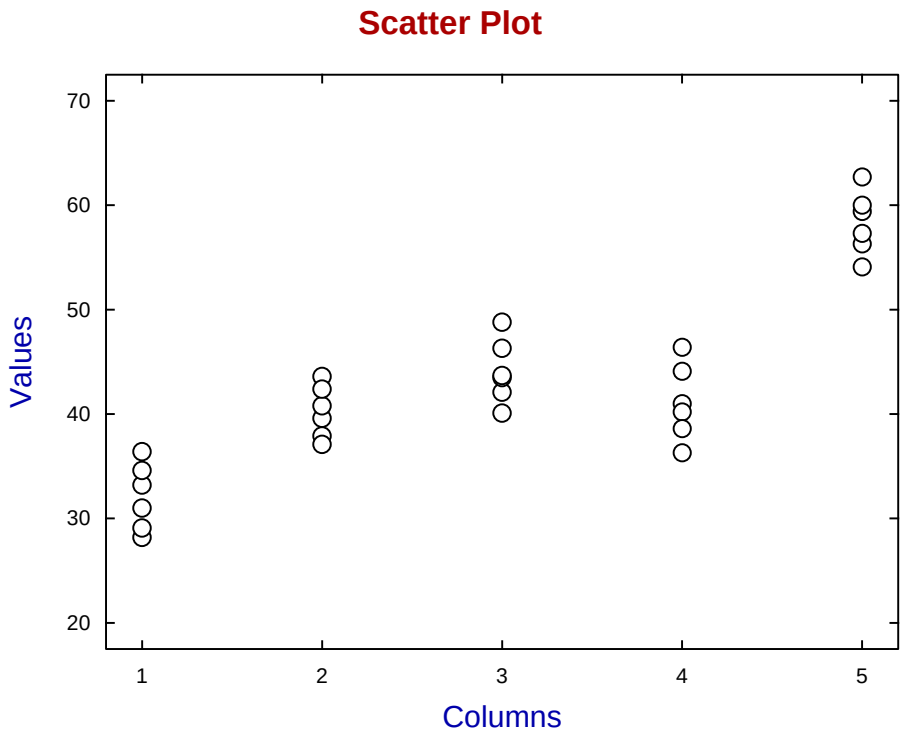
Open the SIMFIT main menu, select the [Statistics] option, choose 1-way-ANOVA, indicate that untransformed data are to be used, then analyze the test file provided which is a data matrix contained in `anova.tf1`. This particular data set is for six replicate estimates for strontium concentrations (mg/ml) in five different locations, and it is wished to test if there are significant differences between the mean levels as listed in the last row.

	28.2	39.6	46.3	41.0	56.3
	33.2	40.8	42.1	44.1	54.1
	36.4	37.9	43.5	46.4	59.4
	34.6	37.1	48.8	40.2	62.7
	29.1	43.6	43.7	38.6	60.0
	31.0	42.4	40.1	36.3	57.3
Means	32.1	40.2	44.1	41.1	58.3

The results, followed by a scatter plot, are as follows.

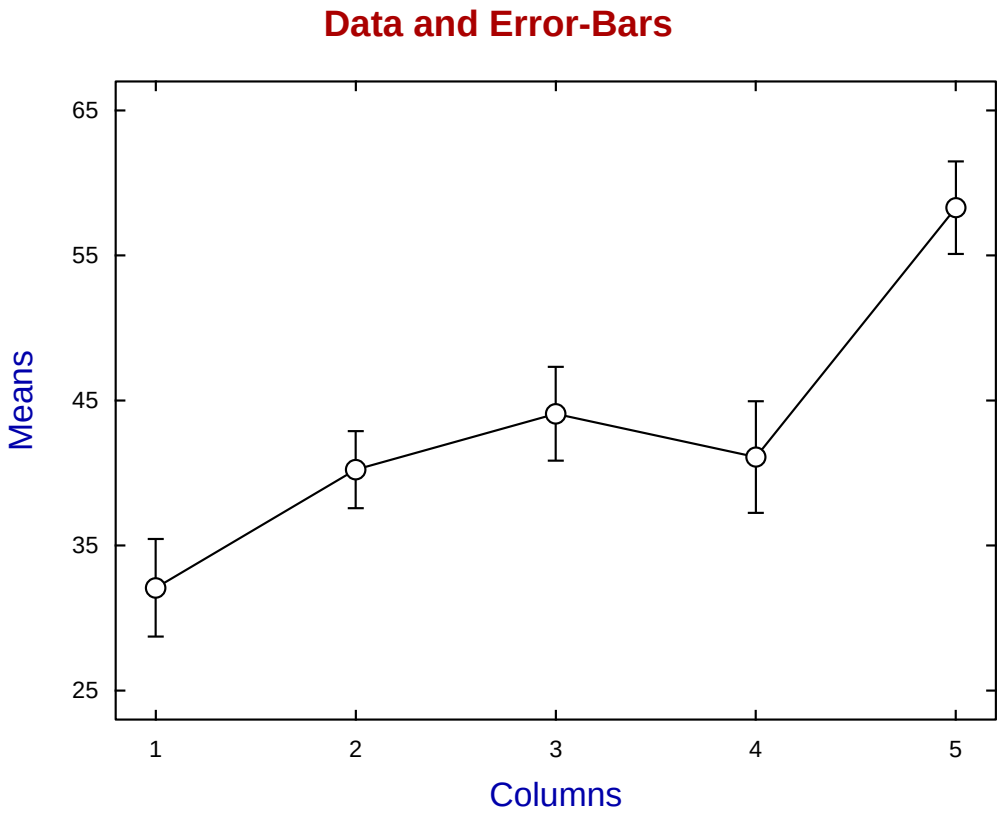
1-Way Analysis of Variance: Grand Mean 43.16
Transformation: x (untransformed data)

Source	SSQ	NDOF	MSQ	F	p
Between Groups	2193	4	548.4	56.15	0.0000
Residual	244.1	25	9.765		
Total	24383	29			



Clearly the null hypothesis of equal column means must be rejected at the 1% significance level as $p < 0.01$. However, this does not tell us which columns are significantly different from the rest, only that at least one column differs significantly. The previous scatter plot does however suggests that column 5 appears atypical, and possibly column 1 also.

Another way to explore this data set is to plot the means with error bars representing the 95% confidence limits as follows.



Example 2

The sample sizes need not be identical for 1-way ANOVA, and the next case to be considered is where there are 5 groups of sizes 5, 8, 6, 8, and 8 for weight gain in pounds of pigs from 5 different litters.

23	29	38	30	31
27	25	31	27	33
26	33	28	28	31
19	36	35	22	28
30	32	33	33	30
	28	36	34	24
	30		34	29
	31		32	30

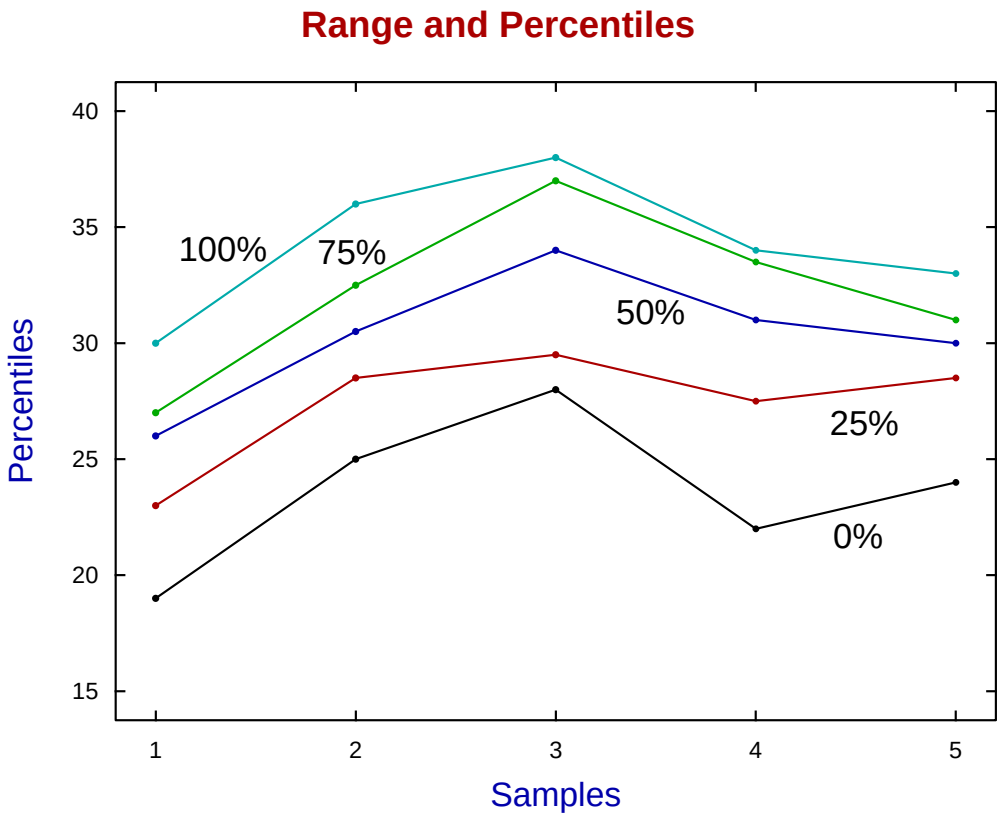
As the sample sizes differ the data cannot be entered as a matrix this time, and must be entered as individual column vectors, from a project archive, or as a library file which simply holds the locations of individual data files for each of the columns.

So now repeat the above procedure, but this time select to supply a library file and input the test file `anova1.TFL` which then reads in data from the test files `column1.tf1`, `column1.tf2`, . . . , `column1.tf5`.

1-Way Analysis of Variance: Grand Mean 29.89
Transformation: x (untransformed data)

Source	SSQ	NDOF	MSQ	F	p
Between Groups	202.0	4	50.51	3.931	0.0111
Residual	385.5	30	12.85		
Total	587.5	34			

There is yet another way to display 1-way ANOVA data as illustrated by the next plot.



Here the lowest line segments join the lowest sample value for the corresponding groups, the upper line segments join the largest sample values, while between them the line segments join the points corresponding to the 25%, 50%, and 75% levels.

This time the results suggest rejecting the null hypothesis of equal means at the 5% significance level as $p < 0.05$, but not the 1% significance level as $p > 0.01$.

The Tukey post-ANOVA Q test to further illuminate the results from this type of analysis will be described in another tutorial document.