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

The Cochran Q test is used to analyze randomized block or repeated-measures observations of a dichotomous variable, i.e. where there can only be one of two possible values such as: success/failure, +/-, 0/1, etc. and it is of interest to examine if successive measurements differ significantly.

To be precise, consider the possible outcome from testing eight people exposed to mosquito attacks with five different types of clothing as follows, where a 1 indicates attacked by mosquitos and a 0 indicates freedom from attack.

Blocks (Subjects)	Groups (Clothing Type)				
	Light-loose	Light-tight	Dark-long	Dark-short	None
1	0	0	0	1	0
2	1	1	1	1	1
3	0	0	0	1	1
4	1	1	0	1	0
5	0	1	1	1	1
6	0	1	0	0	1
7	0	0	1	1	1
8	0	0	1	1	0

The results for blocks (e.g., subjects) are in rows from 1 to n of a matrix while the attributes, which can be either 0 or 1, are in groups, that is, columns 1 to m. So, with n blocks, m groups, G_i as the number of attributes equal to 1 in group i, and B_j as the number of attributes equal to 1 in block j, then the statistic Q is calculated, where

$$Q = \frac{(m-1)\left[\sum_{i=1}^{m} G_i^2 - \frac{1}{m}\left(\sum_{i=1}^{m} G_i\right)^2\right]}{\sum_{j=1}^{n} B_j - \frac{1}{m}\sum_{j=1}^{n} B_j^2}$$

and Q is distributed as approximately chi-square with $m - 1$ degrees of freedom. It is recommended that m should be at least 4 and mn should be at least 24 for the approximation to be satisfactory.

For example, open the main SIMFIT menu, select [Statistics], then [Standard tests], and perform the Cochran Q test on the test file `cochranq.tfl` to obtain the results shown below.

Number of blocks (rows)	7	Rows suppressed:	1 (all 0 or all 1)
Number of groups (columns)	5	Columns suppressed:	1 (not data)
Cochran Q value	6.947		
$P(\chi^2 \geq Q)$	0.1387		
95% chi-square point	9.488		
99% chi-square point	13.28		

Clearly, the test provides no reason to reject the null hypothesis that the proportion of humans in this study attacked by mosquitos is the same for all clothing types. Also, note the following facts about the SIMFIT file format for a Cochran Q test.

1. Rows containing only a 0 or only a 1, like row 2 above, can be included in the data file but they do not contribute to the analysis.

2. An extra column of successive integers, which must be in order from 1 to n, can be included as a first column if required to help you identify the subjects in the results file.