Tutorials and worked examples for simulation, curve fitting, statistical analysis, and plotting.
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Plotting a two-dimensional contour diagram of a three-dimensional surface requires four steps as follows.

1. Define a mathematical model.
2. Fix the values of parameters in the model.
3. Choose the ranges of independent variables.
4. Decide on the number of divisions required.

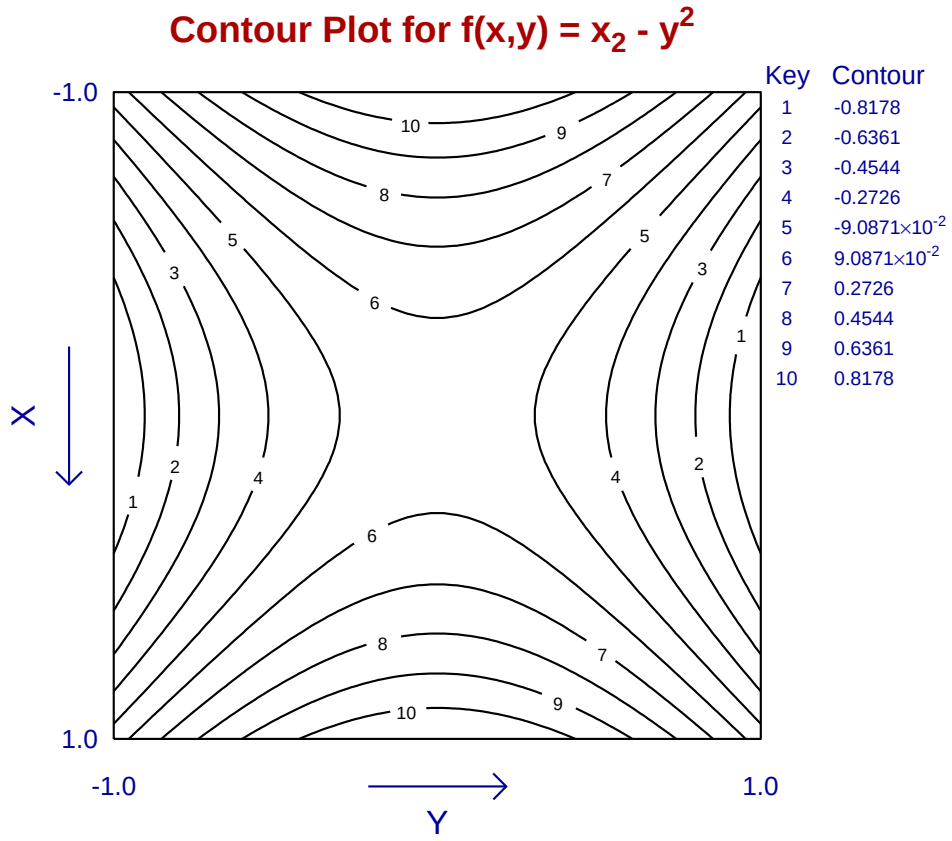
For example, open program **makdat** and choose a function of two variables, then select a polynomial which will have the following definition

$$f(x, y) = p_1 x + p_2 y + p_3 x^2 + p_4 xy + p_5 y^2.$$

In order to plot the function $z = x^2 - y^2$ you will have to fix the parameters as follows

$$p_1 = 0, p_2 = 0, p_3 = 1, p_4 = 0, p(5) = -1$$

then choose to plot a sensible range, e.g. $-1 \le x \le 1, -1 \le y \le 1$, with say 50 divisions which will often be sufficient for a contour diagram, to obtain the following plot.



There are numerous points to consider when editing such a contour plot as follows.

1. While 20 divisions may be sufficient to plot a surface, a larger number of divisions, say at least 50, will be required for a contour plot.
2. Warnings will be output if insufficient divisions have been used leading to failure of the contouring algorithm.
3. There are numerous options to apply smoothing techniques with smaller numbers of divisions or complicated surfaces, but these cannot be expected to substitute for increasing the number of divisions.
4. The numbers indicating the contours and the table of contour values can be suppressed.
5. There are numerous options to choose the number and spacing of the contours. For instance, the default spacing of contour values in an arithmetic progression can be replaced by a geometric progression or even a user-supplied vector of proportions.
6. Color schemes can be used and it is possible to add additional features like arrows, extra text, graphical objects, or even additional curves to highlight trajectories.
7. In some cases it may be useful to plot the three-dimensional surface superimposed on a contour diagram but, when this is done, some of the editing functions for the contour diagram are not available.

The next plot illustrates the result of adding a trajectory to the contour diagram to illustrate the path taken by a constrained optimization algorithm.