



Plotting 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

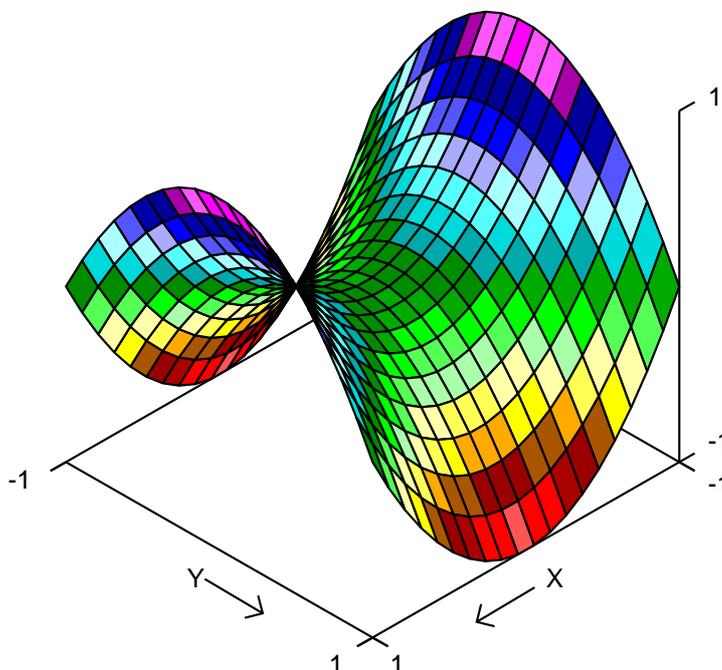
$$f(x, y) = p_1x + p_2y + p_3x^2 + p_4xy + p_5y^2.$$

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.  $-1 \leq x \leq 1, -1 \leq y \leq 1$ , say 20 divisions which will often be sufficient for a surface, to obtain the following plot (after some minor editing).

$$f(x,y) = x^2 - y^2$$



# Contours for Rosenbrock Optimization Trajectory

