

1. Functions of Several Variables.

1.0 Introduction

Many familiar functions are functions of more than one variable eg.

$$\text{Volume of a box} \quad V(a, b, c) = abc$$

is a function of width, depth & height.

Temperature in Australia would be function of longitude (long) and latitude (lat)

$$T(\text{long}, \text{lat}).$$

The profile of a guitar string is a function of the distance along the string and time;

$$f(x, t) = A \sin(x) \cos(t).$$

If $f(x, y)$ is a function of two variables we can picture it as a surface in 3D by letting $z = f(x, y)$. For example

$$z = f(x, y) = x^2 + y^2.$$

Often we represent the surface through contours – like the contours on a map indicating the height of the land above sea level.

Quadratic functions of two variables ($f(x, y)$ quadratic in x and y) have contours which are circles or ellipses or parabolas or hyperbolas.