

Partial Differentiation
Functions of more than one variable

Question

Describe the “level hypersurfaces” for the function

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

Answer

The “level-hypersurface” $f(x, y, z, t) = c > 0$ is the “4-sphere” of radius \sqrt{c} centred at the origin in \mathbf{R}^4 . i.e. it consists of all points in \mathbf{R}^4 at a distance \sqrt{c} from the origin.