

Partial Differentiation
Functions of more than one variable

Question

For each constant C , $f(x, y, z) = C$ is a plane intercepting C^3 on the x -axis, $2C^3$ on the y -axis and $3C^3$ on the z -axis.

Find $f(x, y, z)$.

Answer

If the level surface $f(x, y, z) = C$ is the plane

$$\frac{x}{C^3} + \frac{y}{2C^3} + \frac{z}{3C^3} = 1$$

that is, $x + \frac{y}{2} + z3 = C^3$, then

$$f(x, y, z) = \left(x + \frac{y}{2} + \frac{z}{3}\right)^{1/3}.$$