Homogeneous Function

Given a function $f(x, y)$, it is homogeneous if we are able to multiply each variable by arbitrary variable z (such that $f(zx, zy)$) and then rearrange it to get a function in the form $z^n f(x, y)$.

Degree

Refers to the exponent of z after we rearrange the homogeneous function.

Example

$$\begin{aligned} f(x, y) &= x + 3y \\ f(zx, zy) &= zx + 3zy \\ &= z(x + 3y) \\ &= zf(x, y) \end{aligned}$$

We then have a degree of 1.

This can be useful for dealing with First Order Ordinary Differential Equations (FOODEs) with Homogeneous functions.