Exact Solutions > Functional Equations > Linear Functional Equations with Several Independent Variables > Gauss Equation

6. $f\left(\sqrt{x^2 + y^2}\,\right) = f(x)f(y).$

Gauss equation.

Solution:

$$f(x) = \exp(Cx^2),$$

where C is an arbitrary constant (it can be complex).

Reference

Aczél, J. and Dhombres, J., *Functional Equations in Several Variables*, Cambridge Univ. Press, Cambridge, 1989.

Gauss Equation