



Exact Solutions > Functional Equations > Nonlinear Functional Equations with Several Independent Variables > D'Alembert Equation

3. $f(y + x) + f(y - x) = 2f(x)f(y)$.

D'Alembert equation.

Solutions:

$$f(x) = \cos(Cx), \quad f(x) = \cosh(Cx), \quad f(x) \equiv 0,$$

where C is an arbitrary constant.

References

Fikhtengol'ts, G. M., *A Course of Differential and Integral Calculus, Vol. 1* [in Russian], Nauka, Moscow, 1969 (page 160).

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

Polyanin, A. D. and Manzhirov, A. V., *Handbook of Integral Equations: Exact Solutions (Supplement. Some Functional Equations)* [in Russian], Faktorial, Moscow, 1998.

D'Alembert Equation