Exact Solutions > Functional Equations > Nonlinear Functional Equations with Several Independent Variables

4. Nonlinear Functional Equations with Several Independent Variables

- 1. f(x + y) = f(x)f(y). Exponential Cauchy equation.
- **2.** f(xy) = f(x)f(y). Power-law Cauchy equation.
- 3. f(y+x) + f(y-x) = 2f(x)f(y). D'Alembert equation.
- **4.** $f(x+y) = a^{xy} f(x) f(y)$.
- **5.** f(x+y) = f(x) + f(y) af(x)f(y). Equation of the theory probability.
- **6.** f(x)g(y) = h(x+y).
- 7. f(x)g(y) + h(y) = f(x + y).
- 8. $f(x+y)f(x-y) = f^2(x)$. Lobachevsky equation.

9.
$$\left(\frac{f^2(x)+f^2(y)}{2}\right)^{1/2}=f\left(\left(\frac{x^2+y^2}{2}\right)^{1/2}\right)$$
.

- 10. f(x,y)f(y,z) = f(x,z).
- 11. M(f(x), f(y)) = f(M(x, y)).
- **12.** $f_1(x)g_1(y) + f_2(x)g_2(y) + f_3(x)g_3(y) = 0$. Bilinear functional equation.
- 13. $f_1(x)g_1(y) + f_2(x)g_2(y) + f_3(x)g_3(y) + f_4(x)g_4(y) = 0$. Bilinear functional equation.
- 14. f(x) + g(y) = Q(z), where $z = \varphi(x) + \psi(y)$.
- 15. f(t) + g(x) + h(x)Q(z) + R(z) = 0, where $z = \varphi(x) + \psi(t)$.
- 16. f(t) + g(x)Q(z) + h(x)R(z) = 0, where $z = \varphi(x) + \psi(t)$.

The EqWorld website presents extensive information on solutions to various classes of ordinary differential equations, partial differential equations, integral equations, functional equations, and other mathematical equations.

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http://eqworld.ipmnet.ru/en/solutions/fe/fe-toc4.pdf