3. Linear Functional Equations with Several Independent Variables

1. $f(x+y) = f(x) + f(y)$. *Cauchy equation.*

2. $f(xy) = f(x) + f(y)$. *Logarithmic Cauchy equation.*

3. $2f(x+y) = f(2x) + f(2y)$. *Jensen equation.*

4. $f(x+y) + f(x-y) = 2f(x)\cosh y$.

5. $f(x+y) + f(x-y) = 2f(x)\cos y$.

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

7. $f\left((x^n+y^n)^{1/n}\right) = f(x) + f(y)$.

8. $f(x) + g(y) = h(x+y)$. *Pexider's equation.*

9. $f(x) + (1-x)f\left(\dfrac{y}{1-x}\right) = f(y) + (1-y)f\left(\dfrac{x}{1-y}\right)$.
   Basic equation of information theory.

10. $f(1-x) + (1-x)^{\alpha} f\left(\dfrac{y}{1-x}\right) = f(y) + (1-y)^{\alpha} f\left(\dfrac{x}{1-y}\right)$.

11. $f(ax, ay) = f(x, y)$.

12. $f(ax, ay) = a^{\beta} f(x, y)$. *Homogeneity equation.*

13. $f(ax, a^{\beta}y) = f(x, y)$.

14. $f(ax, a^{\beta}y) = a^{\gamma} f(x, y)$.

15. $f(x, y) + f(y, z) = f(x, z)$.

