



1. Volterra Integral Equations of the First Kind

1-1. Integral equations whose kernels contain power-law functions

1. $\int_a^x (x-t)y(t) dt = f(x).$
2. $\int_a^x (Ax + Bt + C)y(t) dt = f(x).$
3. $\int_a^x (x-t)^n y(t) dt = f(x).$
4. $\int_a^x \sqrt{x-t} y(t) dt = f(x).$
5. $\int_a^x \frac{y(t) dt}{\sqrt{x-t}} = f(x).$ *Abel equation.*
6. $\int_a^x (x-t)^\lambda y(t) dt = f(x).$
7. $\int_a^x \frac{y(t) dt}{(x-t)^\lambda} = f(x).$ *Generalized Abel equation.*

1-2. Integral equations whose kernels contain exponential functions

8. $\int_a^x e^{\lambda(x-t)} y(t) dt = f(x).$
9. $\int_a^x e^{\lambda x + \beta t} y(t) dt = f(x).$
10. $\int_a^x [e^{\lambda(x-t)} - 1] y(t) dt = f(x).$
11. $\int_a^x [e^{\lambda(x-t)} + b] y(t) dt = f(x).$
12. $\int_a^x [e^{\lambda(x-t)} - e^{\mu(x-t)}] y(t) dt = f(x).$
13. $\int_a^x \frac{y(t) dt}{\sqrt{e^{\lambda x} - e^{\lambda t}}} = f(x).$

1-3. Integral equations whose kernels contain hyperbolic functions

14.
$$\int_a^x \cosh[\lambda(x-t)]y(t) dt = f(x).$$

15.
$$\int_a^x \{\cosh[\lambda(x-t)] - 1\}y(t) dt = f(x).$$

16.
$$\int_a^x \{\cosh[\lambda(x-t)] + b\}y(t) dt = f(x).$$

17.
$$\int_a^x \cosh^2[\lambda(x-t)]y(t) dt = f(x).$$

18.
$$\int_a^x \sinh[\lambda(x-t)]y(t) dt = f(x).$$

19.
$$\int_a^x \{\sinh[\lambda(x-t)] + b\}y(t) dt = f(x).$$

20.
$$\int_a^x \sinh(\lambda\sqrt{x-t})y(t) dt = f(x).$$

1-4. Integral equations whose kernels contain logarithmic functions

21.
$$\int_0^x \ln(x-t)y(t) dt = f(x).$$

22.
$$\int_a^x [\ln(x-t) + A]y(t) dt = f(x).$$

23.
$$\int_a^x (x-t)[\ln(x-t) + A]y(t) dt = f(x).$$

1-5. Integral equations whose kernels contain trigonometric functions

24.
$$\int_a^x \cos[\lambda(x-t)]y(t) dt = f(x).$$

25.
$$\int_a^x \{\cos[\lambda(x-t)] - 1\}y(t) dt = f(x).$$

26.
$$\int_a^x \{\cos[\lambda(x-t)] + b\}y(t) dt = f(x).$$

27.
$$\int_a^x \sin[\lambda(x-t)]y(t) dt = f(x).$$

28.
$$\int_a^x \sin(\lambda\sqrt{x-t})y(t) dt = f(x).$$

1-6. Integral equations whose kernels contain special functions

29.
$$\int_a^x J_0(\lambda(x-t))y(t) dt = f(x).$$

30.
$$\int_a^x J_0(\lambda\sqrt{x-t})y(t) dt = f(x).$$

31.
$$\int_a^x I_0(\lambda(x-t))y(t) dt = f(x).$$

32.
$$\int_a^x I_0(\lambda\sqrt{x-t})y(t) dt = f(x).$$

1-7. Integral equations whose kernels contain arbitrary functions

33.
$$\int_a^x [g(x) - g(t)]y(t) dt = f(x).$$

34.
$$\int_a^x [g(x) - g(t) + b]y(t) dt = f(x).$$

35.
$$\int_a^x [g(x) + h(t)]y(t) dt = f(x).$$

36.
$$\int_a^x K(x-t)y(t) dt = f(x).$$

37.
$$\int_a^x \sqrt{g(x) - g(t)} y(t) dt = f(x).$$

38.
$$\int_a^x \frac{y(t) dt}{\sqrt{g(x) - g(t)}} = f(x).$$

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.