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. $\int_a^x \left[e^{\lambda(x-t)} - 1\right] y(t)\,dt = f(x).$

11. $\int_a^x \left[e^{\lambda(x-t)} + b\right] y(t)\,dt = f(x).$

12. $\int_a^x \left[e^{\lambda(x-t)} - e^{\mu(x-t)}\right] y(t)\,dt = f(x).$

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

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

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

1-6. Integral equations whose kernels contain special functions

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

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

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

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

1-7. Integral equations whose kernels contain arbitrary functions

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

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

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

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

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

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