4. Fredholm Integral Equations of the Second Kind

4-1. Integral equations whose kernels contain power-law functions

1. $y(x) - \lambda \int_a^b (x - t) y(t)\, dt = f(x).$

2. $y(x) + A \int_a^b |x - t|\, y(t)\, dt = f(x).$

3. $A y(x) + \frac{B}{\pi} \int_{-1}^{1} \frac{y(t)\, dt}{t - x} = f(x).$

4. $y(x) - \lambda \int_0^1 \left(\frac{1}{t - x} - \frac{1}{x + t - 2xt} \right) y(t)\, dt = f(x).$ *Tricomi's equation.*

4-2. Integral equations whose kernels contain exponential or hyperbolic functions

5. $y(x) + \lambda \int_0^\infty e^{-|x-t|} y(t)\, dt = f(x).$

6. $y(x) - \lambda \int_{-\infty}^\infty e^{-|x-t|} y(t)\, dt = 0.$ *Lalesco–Picard equation.*

7. $y(x) + \lambda \int_{-\infty}^\infty e^{-|x-t|} y(t)\, dt = f(x).$

8. $y(x) + A \int_a^b e^{\lambda|x-t|} y(t)\, dt = f(x).$

9. $y(x) + \lambda \int_{-\infty}^\infty \frac{y(t)\, dt}{\cosh[b(x - t)]} = f(x).$

4-3. Integral equations whose kernels contain trigonometric functions

10. $y(x) - \lambda \int_0^\infty \cos(xt) y(t)\, dt = f(x).$

11. $y(x) - \lambda \int_0^\infty \sin(xt) y(t)\, dt = f(x).$

12. $y(x) - \lambda \int_{-\infty}^\infty \frac{\sin(x - t)}{x - t} y(t)\, dt = f(x).$

13. $A y(x) - \frac{B}{2\pi} \int_0^{2\pi} \cot\left(\frac{t - x}{2} \right) y(t)\, dt = f(x).$

14. $y(x) - \lambda \int_0^\infty e^{\mu(x-t)} \cos(xt) y(t)\, dt = f(x).$

15. $y(x) - \lambda \int_0^\infty e^{\mu(x-t)} \sin(xt) y(t)\, dt = f(x).$

4-4. Integral equations whose kernels contain arbitrary functions

16. $y(x) - \int_{-\infty}^\infty K(x-t) y(t)\, dt = f(x).$

17. $y(x) - \int_0^\infty K(x-t) y(t)\, dt = f(x).$ *Wiener–Hopf equation of the second kind.*