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$$6. \quad y(x) - \lambda \int_{-\infty}^{\infty} e^{-|x-t|} y(t) dt = 0, \quad \lambda > 0.$$

Lalesco–Picard equation.

Solution:

$$y(x) = \begin{cases} C_1 \exp(x\sqrt{1-2\lambda}) + C_2 \exp(-x\sqrt{1-2\lambda}) & \text{for } 0 < \lambda < \frac{1}{2}, \\ C_1 + C_2 x & \text{for } \lambda = \frac{1}{2}, \\ C_1 \cos(x\sqrt{2\lambda-1}) + C_2 \sin(x\sqrt{2\lambda-1}) & \text{for } \lambda > \frac{1}{2}, \end{cases}$$

where C_1 and C_2 are arbitrary constants.

References

Krasnov, M. L., Kiselev, A. I., and Makarenko, G. I., *Problems and Exercises in Integral Equations*, Mir Publ., Moscow, 1971.

Polyanin, A. D. and Manzhirov, A. V., *Handbook of Integral Equations*, CRC Press, Boca Raton, 1998.

Lalesco–Picard

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