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$$6. \quad y(x) + \lambda \int_a^x \frac{y(t) dt}{\sqrt{x-t}} = f(x).$$

Abel equation of the second kind (Abel integral equation of the second kind). This equation is encountered in problems of heat and mass transfer.

Solution:

$$y(x) = F(x) + \pi\lambda^2 \int_a^x \exp[\pi\lambda^2(x-t)]F(t) dt,$$

where

$$F(x) = f(x) - \lambda \int_a^x \frac{f(t) dt}{\sqrt{x-t}}.$$

References

- Brakhage, H., Nickel, K., and Rieder, P.**, *Auflösung der Abelschen Integralgleichung 2. Art*, ZAMP, Vol. 16, Fasc. 2, S. 295–298, 1965.
- Babenko, Yu. I.**, *Heat and Mass Transfer: A Method for Computing Heat and Diffusion Flows* [in Russian], Khimiya, Moscow, 1986.
- Gorenflo, R. and Vessella, S.**, *Abel Integral Equations: Analysis and Applications*, Springer-Verlag, Berlin–New York, 1991.
- Polyanin, A. D. and Manzhirov, A. V.**, *Handbook of Integral Equations*, CRC Press, Boca Raton, 1998.

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