



Exact Solutions > Integral Equations > Linear Volterra Integral Equations of the First Kind and Related Integral Equations with Variable Limit of Integration > Abel Equation (Abel Integral Equation)

$$5. \int_a^x \frac{y(t) dt}{\sqrt{x-t}} = f(x).$$

**Abel equation (Abel integral equation).**

Solution:

$$y(x) = \frac{1}{\pi} \frac{d}{dx} \int_a^x \frac{f(t) dt}{\sqrt{x-t}} = \frac{f(a)}{\pi\sqrt{x-a}} + \frac{1}{\pi} \int_a^x \frac{f'_t(t) dt}{\sqrt{x-t}}.$$

See also:

- [generalized Abel equation](#) ,
- [Abel integral equation of the second kind](#) ,
- [generalized Abel integral equation of the second kind](#) .

### References

- Whittaker, E. T. and Watson, G. N.**, *A Course of Modern Analysis*, Cambridge Univ. Press, Cambridge, 1958.
- Gorenflo, R. and Vessella, S.**, *Abel Integral Equations: Analysis and Applications*, Springer-Verlag, Berlin–New York, 1991.
- Samko, S. G., Kilbas, A. A., and Marichev, O. I.**, *Fractional Integrals and Derivatives. Theory and Applications*, Gordon & Breach Sci. Publ., New York, 1993.
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