Exact Solutions > Ordinary Differential Equations > First-Order Ordinary Differential Equations >
First-Order Autonomous Differential Equation

1. $y'_x = f(y)$.

First-order autonomous differential equation.

   Solution:

$$x = \int \frac{dy}{f(y)} + C,$$

where C is an arbitrary constant.

   Particular solutions: $y = A_k$, where the A_k are roots of the algebraic (transcendental) equation $f(A_k) = 0$.

References

Boyce, W. E. and DiPrima, R. C., *Elementary Differential Equations, 7th Edition*, Wiley, New York, 2000.

Polyanin, A. D. and Zaitsev, V. F., *Handbook of Exact Solutions for Ordinary Differential Equations, 2nd Edition* , Chapman & Hall/CRC, Boca Raton, 2003.

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