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Riccati Equation, Special Case 11

17. $\quad y'_x = ae^{\lambda x}y^2 + ae^{\lambda x}f(x)y + \lambda f(x).$

Riccati equation, special case 11.

Particular solution: $y_0 = -\dfrac{\lambda}{a}e^{-\lambda x}.$

The general solution can be written as:

$$y = -\frac{\lambda}{a}e^{-\lambda x} + \Phi(x)\left[C - a\int e^{\lambda x}\Phi(x)\,dx\right]^{-1}, \quad \text{where} \quad \Phi(x) = \exp\left\{-2\lambda x + a\int e^{\lambda x}f(x)\right]\,dx\right\},$$

C is an arbitrary constant.

Reference

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