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$$16. \quad y'_x = f(x)y^2 + g(x)y + anx^{n-1} - a^2x^{2n}f(x) - ax^n g(x).$$

Riccati equation, special case 10.

Particular solution: $y_0 = ax^n$.

The general solution can be written as:

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

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.

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