

42.
$$y_{xx}'' + (f + ae^{\lambda x})y_x' + ae^{\lambda x}(f + \lambda)y = 0,$$
 $f = f(x)$.

Particular solution: $y_0 = \exp\left(-\frac{a}{\lambda}e^{\lambda x}\right)$.

Solution:

$$y = y_0 \left(C_1 + C_2 \int \frac{e^{-F}}{y_0^2} dx \right)$$
, where $F = \frac{a}{\lambda} e^{\lambda x} + \int f dx$,

 C_1 and C_2 are arbitrary constants.

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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