

First-Order Partial Differential Equations > Linear Equations > Section 1.2

9.
$$\frac{\partial w}{\partial x} + \left[f(x)y + g(x)y^k \right] \frac{\partial w}{\partial y} = h(x)$$
.

General solution:

$$w = \int h(x) \, dx + \Phi(u),$$

where $\Phi(u)$ is an arbitrary function,

$$u = e^{-F}y^{1-k} - (1-k)\int e^{-F}g(x) dx, \quad F = (1-k)\int f(x) dx.$$

Reference

Polyanin, A. D., Zaitsev, V. F., and Moussiaux, A., Handbook of First Order Partial Differential Equations, Taylor & Francis, London, 2002.

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http://eqworld.ipmnet.ru/en/solutions/fpde/fpde1209.pdf