

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

11.
$$ax \frac{\partial w}{\partial x} + by \frac{\partial w}{\partial y} = f(x, y)$$
.

General solution:

$$w = \frac{1}{a} \int \frac{1}{x} f(x, u^{1/a} x^{b/a}) dx + \Phi(u), \text{ where } u = y^a x^{-b}.$$

In the integration, u is considered a parameter; $\Phi(u)$ is an arbitrary function.

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/fpde1211.pdf