

First-Order Partial Differential Equations > Nonlinear Equations > Section 3.3

15.
$$\frac{\partial w}{\partial x} + yF_1\left(x, \frac{\partial w}{\partial y}\right) + F_2\left(x, \frac{\partial w}{\partial y}\right) = 0.$$

Complete integral:

$$w = \varphi(x)y - \int F_2(x, \varphi(x)) dx + C_1,$$

where C_1 is an arbitrary constant and the function $\varphi(x)$ is determined by solving the ordinary differential equation $\varphi'_x + F_1(x, \varphi) = 0$.

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/fpde3315.pdf