

First-Order Partial Differential Equations > Quasilinear Equations > Section 2.3

10.
$$\frac{\partial w}{\partial x} + f(x, w) \frac{\partial w}{\partial y} = g(x)$$
.

General solution:

$$y = \int_{x_0}^x f(t, G(t) - G(x) + w) dt + \Phi(w - G(x)),$$

where $G(x) = \int g(x) dx$ and $\Phi(u)$ 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/fpde2310.pdf