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

23. $F\left(w,\ \dfrac{\partial w}{\partial x},\ \dfrac{\partial w}{\partial y},\ x\dfrac{\partial w}{\partial x} + y\dfrac{\partial w}{\partial y}\right) = 0.$

Complete integral:

$$w = \varphi(\xi), \quad \xi = C_1 x + C_2 y,$$

where C_1 and C_2 are arbitrary constants, and the function $\varphi(\xi)$ is determined by solving the nonlinear ordinary differential equation $F\left(\varphi,\ C_1\varphi'_\xi,\ C_2\varphi'_\xi,\ \xi\varphi'_\xi\right) = 0.$

Reference

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

http://eqworld.ipmnet.ru/en/solutions/fpde/fpde3323.pdf