

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

19.
$$F\left(ax+by,\frac{\partial w}{\partial x},\frac{\partial w}{\partial y}\right)=0.$$

For b = 0, see equation 3.3.18.

Complete integral for $b \neq 0$:

$$w = C_1 x + \varphi(z, C_1) + C_2, \quad z = ax + by,$$

where C_1 and C_2 are arbitrary constants, and the function $\varphi = \varphi(z)$ is determined from the nonlinear ordinary differential equation $F(z, a\varphi'_z + C_1, b\varphi'_z) = 0$.

Reference

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

Copyright © 2004 Andrei D. Polyanin

http://eqworld.ipmnet.ru/en/solutions/fpde/fpde3319.pdf