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

For $b=0$, see equation 3.3.18.

Complete integral for $b\neq 0$:

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

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

Reference

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

