First-Order Partial Differential Equations > Linear Equations > Section 1.1

8. $\dfrac{\partial w}{\partial x} + f\left(\dfrac{y}{x}\right)\dfrac{\partial w}{\partial y} = 0.$

$1°$. Principal integral: $\Xi = \displaystyle\int \dfrac{dv}{f(v) - v} - \ln|x|$, where $v = \dfrac{y}{x}$.

$2°$. General solution: $w = \Phi(\Xi)$, where $\Phi(\Xi)$ 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.