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

Complete integral:

$$w = e^{ax}(C_1 y + C_2) - e^{ax} \int e^{-ax} F(x, C_1 e^{ax})\, dx,$$

where C_1 and C_2 are arbitrary constants.

Reference

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