

19. $y_{xx}'' + [2ay + f(x)]y_x' + af(x)y^2 = g(x)$. On setting $u = y_x' + ay^2$, we obtain a first-order linear equation: $u_x' + f(x)u = g(x)$.

Reference

Polyanin, A. D. and Zaitsev, V. F., Handbook of Exact Solutions for Ordinary Differential Equations, 2nd Edition, Chapman & Hall/CRC, Boca Raton, 2003.

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