

37.
$$yy_{xx}'' - n(y_x')^2 + f(x)y^2 + g(x)y^{n+1} = 0$$
.

The substitution $w = y^{1-n}$ leads to a nonhomogeneous linear equation:

$$w_{xx}'' + (1-n)f(x)w + (1-n)g(x) = 0.$$

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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