43. $y'_x = -\dfrac{n}{x} + f(x)g(x^n e^y).$

The substitution $z = x^n e^y$ leads to a separable equation: $z'_x = f(x)zg(z).$

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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