Solution

$y' = y^2 \cdot e^x - 2 \cdot y: \quad y = \frac{1}{e^x\left(1 + c_1 e^x\right)}$

Steps

$y' = y^2 \cdot e^x - 2 \cdot y$

First order Bernoulli Ordinary Differential Equation

A first order Bernoulli ODE has the form of $y' + p(x)y = q(x)y^n$

Rewrite in the form of a first order Bernoulli ODE *Show Steps*

$y' + 2y = e^x y^2$

$y' + p(x)y = q(x)y^n$

$p(x) = 2, \quad q(x) = e^x, \quad n = 2$

The general solution is obtained by substituting $v = y^{1-n}$ and solving $\frac{1}{1-n}v' + p(x)v = q(x)$

Transform to $\frac{1}{1-n}v' + p(x)v = q(x)$: $-\mathrm{v}' + 2\mathrm{v} = e^x$ *Show Steps*

Solve $-\mathrm{v}' + 2\mathrm{v} = e^x$: $\mathrm{v} = e^{2x}\left(e^{-x} + c_1\right)$ *Show Steps*

Substitute back $\mathrm{v} = y^{-1}$: $y^{-1} = e^{2x}\left(e^{-x} + c_1\right)$ *Show Steps*

Isolate y: $y = \frac{1}{e^x\left(1 + c_1 e^x\right)}$ *Show Steps*

$y = \frac{1}{e^x\left(1 + c_1 e^x\right)}$

Symbolab