

Conditions

Find all solutions to the differential equation $y' = -10y$. Is this a differential equation for exponential decay or exponential growth? What is the doubling time/half-life?

Solution

$$y' = -10y$$

$$y' = -\frac{y}{\frac{1}{10}}$$

$$\frac{dy}{y} = -\frac{dx}{10}$$

$$\ln y = -\frac{x}{10} + c$$

$$y = e^{-\frac{x}{10} + c}$$

This is an exponential decay.