

November 19


Are the following two equations equivalent? Why or why not.

$$y = 4e^{5x}$$

$$y = e^{1.3869 + 5x}$$

$e^{1.3869 + 5x}$
 $e^{\ln 4 + 5x}$
 $e^{\ln 4} e^{5x}$
 $4e^{5x}$

$e^{1.3869} = 4$
 $1.3869 \approx \ln 4$



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Students will verbally explain how to find the solution to a differential equation

(using the words:
separate, initial value, constant ...)



$$\frac{dy}{dx} = 19y$$

$$y(0) = 2$$

$$\frac{dy}{y} = 19 dx$$

$$\int \frac{1}{y} dy = \int 19 dx$$

$$\ln|y| = 19x + C$$

$$\ln|2| = 19(0) + C$$

$$\ln 2 = C$$

$$\ln|y| = 19x + \ln 2$$

$$e^{\ln|y|} = e^{19x + \ln 2}$$

$$|y| = e^{19x} e^{\ln 2}$$

$$y = 2e^{19x}$$

Differential Equation	Solution	Differential Equation	Solution
$\frac{dy}{dx} = 27y$ if $y(0) = 23$	$y = 23e^{27x}$	$\frac{dy}{dx} = 14y$ if $y(0) = 6$	$y = 6e^{14x}$
$\frac{dy}{dx} = 18y$ if $y(0) = 15$	$y = 15e^{18x}$	$\frac{dy}{dx} = 6y$ if $y(0) = 11$	$y = 11e^{6x}$
$\frac{dy}{dx} = 16y$ if $y(0) = 30$	$y = 30e^{16x}$	$\frac{dy}{dx} = 9y$ if $y(0) = 5$	$y = 5e^{9x}$
$\frac{dy}{dx} = 11y$ if $y(0) = 21$	$y = 21e^{11x}$	$\frac{dy}{dx} = 12y$ if $y(0) = 4$	$y = 4e^{12x}$
$\frac{dy}{dx} = 19y$ if $y(0) = 2$	$y = 2e^{19x}$	$\frac{dy}{dx} = 7y$ if $y(0) = 10$	$y = 10e^{7x}$
$\frac{dy}{dx} = 4y$ if $y(0) = 9$	$y = 9e^{4x}$	$\frac{dy}{dx} = 5y$ if $y(0) = 7$	$y = 7e^{5x}$

exponential
change

$$\text{if } \frac{dy}{dt} = Ky$$

(K is a constant)

$$\text{with } y = y_0 \text{ when } t = 0$$

$$\text{Then } y = y_0 e^{Kt}$$

$$\text{If } \frac{dy}{dt} = 4y$$
$$\text{and } y(0) = -18$$
$$\text{find } y$$

$$y = -18e^{4t}$$

$$\frac{dy}{dx} = 3y$$
$$\text{and } y(2) = 6$$
$$\text{find } y$$

$$y = Ce^{3x}$$
$$6 = Ce^{3(2)}$$
$$\frac{6}{e^6} = \frac{Ce^6}{e^6}$$

$$C = \frac{6}{e^6}$$

$$y = \frac{6}{e^6} e^{3x}$$

$$y = \frac{6e^{-6} e^{3x}}{e^{3x-6}}$$