
Which of the following differential equations is $y = c_1\cos(t) + c_2\sin(t)$ a two-parameter family of solutions for?

- A. $y'' + y = 0$
- B. $y'' + y' + y = 0$
- C. $y'' - y = 0$
- D. $y' + y = 0$

Correct Answers:

- A

Note that $x = ce^{-t}$ is a one-parameter solution for the differential equation $x' + x = 0$. Which of the following is a solution to the first-order IVP consisting of the differential equation $x' + x = 0$ and the initial condition $x(0) = 7$.

- A. $x = \frac{1}{7}e^{-t}$
- B. $x = 7e^{-t+1}$
- C. $x = 0$
- D. $x = 7e^{-t}$

Correct Answers:

- D

Note that $y = c_1\cos(-t) + c_2\sin(-t)$ is a two-parameter solution for the second-order differential equation $y'' + y = 0$. Which of the following is a solution to the second-order IVP consisting of the differential equation $y'' + y = 0$ and the initial condition $y(-\frac{\pi}{2}) = 2$, $y'(-\frac{\pi}{2}) = 3$.

- A. $y = 3\cos(-t) - 2\sin(-t)$
- B. $y = 2\cos(-t) + 3\sin(-t)$
- C. $y = 3\cos(-t) + 2\sin(-t)$
- D. $y = \cos(-2) + 2\sin(-3)$

What is the largest integral I over which the solution from the previous part is defined?

- A. $\left(-\frac{\pi}{2}, \infty\right)$
- B. $(-\infty, \infty)$
- C. $\left(-\infty, -\frac{\pi}{2}\right)$

Correct Answers:

- C
- B

Note that $y = \dfrac{1}{c+x}$ is a one-parameter solution for the differential equation $y' + y^2 = 0$. Which of the following is a solution to the first-order IVP consisting of the differential equation $y' + y^2 = 0$ and the initial condition $y(3) = \frac{1}{5}$.

- A. $y = \dfrac{1}{5+x}$
- B. $y = \dfrac{1}{2+x}$
- C. $y = \dfrac{1}{3+x}$
- D. $y = \dfrac{1}{c+x} + 5$

What is the largest integral I over which the solution from the previous part is defined?

- A. $(-\infty, -2)$
- B. $(-\infty, \infty)$
- C. $(-2, \infty)$
- D. $(3, \infty)$

Correct Answers:

- B
- C

Note that $y = c_1 e^x + c_2 e^{-x}$ is a two-parameter solution for the second-order differential equation $y'' - y = 0$. Which of the following is a solution to the second-order IVP consisting of the differential equation $y'' - y = 0$ and the initial condition $y(1) = 1$, $y'(1) = 2$.

- A. $y = \frac{3}{2} e^{x-1} - \frac{1}{2} e^{1-x}$
- B. $y = \frac{e}{2} e^x + \frac{1}{2} e^{-x}$
- C. $y = e^x + 2e^{-x}$
- D. $y = \frac{3}{2} e^x - \frac{1}{2} e^x$

What is the largest integral I over which the solution from the previous part is defined?

- A. $(0, \infty)$
- B. $(-\infty, \infty)$
- C. $(-\infty, 0)$

Correct Answers:

- A
- B

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6. (1 point) Note that $y = c_1 e^x + c_2 e^{-x}$ is a two-parameter solution for the second-order differential equation $y'' - y = 0$. Find values c_1 and c_2 so that y is a solution to the second-order IVP consisting of the differential equation $y'' - y = 0$ and the initial condition $y(0) = 3$, $y'(0) = 9$. The values are $c_1 =$ ____ and $c_2 =$ ____.

Correct Answers:

- 6
- -3

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