
Suppose $y_1 = \sin(x)$ and $y_2 = \cos(x)$ are solutions to a homogeneous linear differential equation $F(x, y, y', y'') = 0$. Which of the following best reflects what are additional solutions for the differential equation?

- A. $y = 2\sin(x) - 3\cos(x)$
- B. All of the functions listed here.
- C. $y = -3\cos(x) - \pi\sin(x)$
- D. $y = \sqrt{2}\sin(x) + 3\cos(x)$

Answer(s) submitted:

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(incorrect)

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2. (1 point) Select the following pairs of functions that are linearly independent.

- A. $y_1 = 9x,\ y_2 = x$
- B. $y_1 = \cos(x),\ y_2 = \sin(x)$
- C. $y_1 = 1,\ y_2 = x$
- D. $y_1 = e^x,\ y_2 = 5e^x$
- E. $y_1 = e^x,\ y_2 = e^{-x}$
- F. $y_1 = \sin(x),\ y_2 = -\sin(x)$
- G. None of the above

Answer(s) submitted:

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(incorrect)

#3 Suppose $F(x, y, y', y'', \ldots, y^{(8)}) = 0$ an order 8 linear differential equation. Which of the following statements is NOT true, regarding a fundamental set of solutions for the DE?

- A. That the functions in the set are linearly independent.
- B. That any of the functions multiplied together form another solution.
- C. That the set must consit of 8 functions..
- D. That the functions in the set are all solutions.

Answer(s) submitted:

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(incorrect)

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4. (1 point) Suppose $y_1 = e^{5x}$ and $y_2 = e^{2x}$ are solutions to a homogeneous linear differential equation. Use the Wronskian to show that the solutions are linearly independent. $2e^{7x} - 5e^{7x}$

$$\text{Wronskian} = \det\begin{bmatrix} \underline{e^{5x}} & \underline{e^{2x}} \\ \underline{5e^{5x}} & \underline{2e^{2x}} \end{bmatrix} = \underline{-3e^{7x}} \neq \emptyset$$

These solutions are linearly independent because the Wronskian is [Choose/zero/nonzero] for all x.

Answer(s) submitted:

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(incorrect)

#5 It can be shown that $y_1 = e^{-3x}$ and $y_2 = xe^{-3x}$ are solutions to the differential equation $y'' + 6y' + 9y = 0$ on $(-\infty, \infty)$.

What does the Wronskian of y_1, y_2 equal on $(-\infty, \infty)$?

$W(y_1, y_2) =$ $\underline{e^{-6x}}$ on $(-\infty, \infty)$.

yes

$\boxed{?}$ 1. Is $\{y_1, y_2\}$ a fundamental set for $y'' + 6y' + 9y = 0$ on $(-\infty, \infty)$?

Answer(s) submitted:

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(incorrect)

$$W(y_1,y_2) = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} e^{-3x} & xe^{-3x} \\ -3e^{-3x} & e^{-3x} + xe^{-3x}\cdot(-3) \end{vmatrix} = e^{-3x}\cdot e^{-3x}\begin{vmatrix} 1 & x \\ -3 & 1-3x \end{vmatrix} = e^{-6x}\begin{vmatrix} 1 & x \\ -3x & 1-3x \end{vmatrix} = e^{-6x}\begin{vmatrix} 1 & x \\ -3x & 1-3x \end{vmatrix} = e^{-6x}(1-3x+3x)$$

$W(y_1, y_2) = e^{-6x}$ on $(-\infty, \infty)$

$W \neq \emptyset \rightarrow \{y_1, y_2\}$ is a fundamental set for $y'' + 6y' + 9y = \emptyset$

#6 Suppose $y = c_1 y_1 + \cdots + c_n y_n$ a general solution for a homogeneous linear differential equation of order 4. Which of the following statements is NOT true, regarding the functions $y_1, \ldots, y_n$?

- A. That any two of the functions multiplied together are again a solution.

#6

- B. That the functions are linearly independent.
- C. That $n = 4$.
- D. That the functions are all solutions of the DE.

Answer(s) submitted:

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(incorrect)