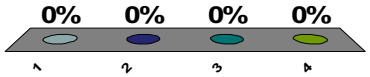
Ordinary Differential Equations

Clicker questions

What is the order of the following differential equation?

$y'' - 2y' + y = 0$

1. 1
2. ✓ 2
3. 3
4. 4



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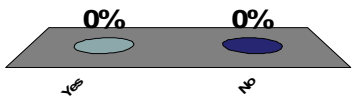
Is the following differential equation linear?

$y'' - 2y' + y = 0$

1. ✓ Yes
2. No



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Are $y_1(x)=e^x$ and $y_2(x)=x\,e^x$ solutions of the following differential equation?

$y'' - 2y' + y = 0$

1. ✓ Yes
2. No

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Are $y_1(x)=e^x$ and $y_2(x)=x\,e^x$ linearly independent?

✔1. Yes
2. No

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Does the following initial value problem have a unique solution near x = 0, y = 1, y'=0?

$y'' - 2y' + y = 0, \quad y(0) = 1, \quad y'(0) = 0$

✔1. Yes
2. No

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Does the following initial value problem have a unique solution near x = 0, y = 1, y'=0?

$y'' - 2y' + y = 0, \quad y(0) = 1, \quad y'(0) = 0, \quad y''(0) = 2$

1. Yes
✔2. No

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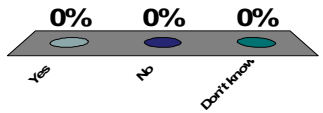
Does the following initial value problem have a unique solution for all values of y_0?

$y' = y^{1/2}, \quad y(0) = y_0$

1. Yes
2. No
3. Don't know



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Does the following initial value problem have a unique solution near $x = 1$, $y = 1$?

$y' = y^2, \quad y(1) = 1$

✔1. Yes
2. No

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Does the solution to the following initial value problem exist for all values of x?

$y' = y^2, \quad y(1) = 1$

1. Yes
✔2. No

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Does the following initial value problem have a unique solution for all values of x?

$y'' - 2y' + y = 3x, \quad y(0) = 1, \quad y'(0) = 0$

✔1. Yes
2. No

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Does the following initial value problem have a unique solution on the interval $[-1, 1]$?

$y^{(4)} - x^3 y'' + 3y = 0,$

$y(0) = 1, \quad y'(0) = 1, \quad y''(0) = 0, \quad y^{(3)}(0) = 0$

✔1. Yes
2. No

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Are $y_1(x)=x$, $y_2(x)=x\,e^x$, $y_3(x)=x^3$ and $y_4(x)=x\,e^{3x}$ linearly independent?

✔1. Yes
2. No

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