

Your Name

Student ID #

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In these problems, **check all that apply**.

1. Consider the differential equation

$$\frac{1}{2}y'' + y' + y = 1.$$

This equation...

- |   |   |
|---|---|
| <input type="radio"/> is linear                   | <input type="radio"/> is non-linear                 |
| <input type="radio"/> is first order              | <input type="radio"/> is second order               |
| <input type="radio"/> is homogeneous              | <input type="radio"/> is non-homogeneous            |
| <input type="radio"/> has constant coefficients   | <input type="radio"/> has non-constant coefficients |
| <input type="radio"/> is an initial value problem |   |

The characteristic equation...

- |   |   |
|---|---|
| <input type="radio"/> has distinct real roots | <input type="radio"/> has repeated roots  |
| <input type="radio"/> has complex roots       | <input type="radio"/> does not make sense |

The **general solution** to this equation can be found using...

- reduction of order, with  $y_1 = \underline{\hspace{2cm}}$
- variation of parameters, with  $y_1 = \underline{\hspace{2cm}}$ ,  $y_2 = \underline{\hspace{2cm}}$
- undetermined coefficients, with  $Y = \underline{\hspace{2cm}}$
- none of the above

2. Consider

$$y'' - \frac{2}{t^2}y = 0, \quad y(1) = 1, y'(1) = 2, \quad t > 0.$$

This equation...

- |   |   |
|---|---|
| <input type="radio"/> is linear                   | <input type="radio"/> is non-linear                 |
| <input type="radio"/> is first order              | <input type="radio"/> is second order               |
| <input type="radio"/> is homogeneous              | <input type="radio"/> is non-homogeneous            |
| <input type="radio"/> has constant coefficients   | <input type="radio"/> has non-constant coefficients |
| <input type="radio"/> is an initial value problem |   |

The characteristic equation...

- |   |   |
|---|---|
| <input type="radio"/> has distinct real roots | <input type="radio"/> has repeated roots  |
| <input type="radio"/> has complex roots       | <input type="radio"/> does not make sense |

The solution to this problem can be found using...

- reduction of order, with  $y_1 = t^2$
- variation of parameters, with  $y_1 = t^3$ ,  $y_2 = t^4$
- undetermined coefficients, with  $Y(t) = At^2$
- none of the above