

## Practice problems

Solve the ODE using any method that applies (undetermined coefficients, variation of parameters, Laplace transform, or series solution)

1)  $y^{(4)} - 4y = 0$ ;  $y(0) = 1$ ,  $y'(0) = 0$ ,  $y''(0) = -2$ ,  $y'''(0) = 0$

2)  $y'' + 4y' + 4y = t^2 e^{-2t}$   $t > 0$

3)  $y'' - 2y' - y = 0$

4)  $y'' + y' - 2y = 2t$ ,  $y(0) = 0$ ,  $y'(0) = 1$

Hints (all problems were on HWs)

- 1) It is degree  $> 2$ , so try Laplace transform.  
This is § 6.2, problem 19
  - 2)  $g(t) = t^2 e^{-2t}$ , so undetermined coefficients & Laplace transform won't work; try variation of parameters.  
This is § 3.6, problem 7.
  - 3) The coefficients are not constants, so try a series solution.  
This is § 5.2 problem 3 (but you can pick any center  $x_0$ )
  - 4) All methods apply, but undetermined coefficients would be the easiest. This is § 3.5, problem 15
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