

**MTHSC 208 (Differential Equations)**  
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**HW 6**  
**Due Monday September 14th, 2009**

- (1) For each of the second-order differential equations below, decide whether the equation is linear or nonlinear. If the equation is linear, state whether the equation is homogeneous or inhomogeneous.
- (a)  $y'' + 3y' + 5y = 3 \cos 2t$
  - (b)  $t^2 y'' = 4y' - \sin t$
  - (c)  $t^2 y'' + (1 - y)y' = \cos t$
  - (d)  $ty'' + (\sin t)y' = 4y - \cos 5t$
  - (e)  $t^2 y'' + 4yy' = 0$
  - (f)  $y'' + 4y' + 7y = 3e^{-t} \sin t$
  - (g)  $y'' + 3y' + 4 \sin y = 0$
  - (h)  $(1 - t^2)y'' = 3y$
- (2) Find the general solution to the following 2<sup>nd</sup> order linear homogeneous ODEs.
- (a)  $y'' + 5y' + 6y = 0$
  - (b)  $y'' + y' - 12y = 0$
  - (c)  $y'' - 4y' + 4y = 0$
  - (d)  $4y'' + 12y' + 9y = 0$
- (3) Find the particular solution to the following 2<sup>nd</sup> order linear homogeneous ODEs.
- (a)  $y'' - y' - 2y = 0, \quad y(0) = -1, \quad y'(0) = 2$
  - (b)  $y'' - 4y' - 5y = 0, \quad y(1) = -1, \quad y'(1) = -1$
- (4) Find the general solution to the following 2<sup>nd</sup> order linear inhomogeneous ODEs, by solving the associated homogeneous equation, and then finding a constant (particular) solution.
- (a)  $y'' + y' - 12y = 24$
  - (a)  $y'' = -4y + 3$