Ma 2 - Written Homework #5
Due Monday, November 7, 2016 before 4pm

Name (Print):

Please write down the question number at the beginning of your solution. You can use this sheet as a cover.

1. (10 points) Section 3.5
   Find the general solution of the differential equation
   \[ y'' + 2y' + 2y = 2e^{3t} + e^{-t}. \] (1)

2. (10 points) Section 3.6
   Use the method of variation of parameters to find the general solution to the given differential equation
   \[ y'' + 4y' + 4y = t^{-2}e^{-2t}, \quad t > 0. \] (2)

3. (10 points) Section 3.6
   Verify the given functions \( y_1 \) and \( y_2 \) are the solutions to the corresponding homogenous differential equation, then find a particular solution to the nonhomogenous one.
   \[ t^2y'' - t(t + 2)y' + (t + 2)y = 2t^3, \quad t > 0; \quad y_1(t) = t, \quad y_2(t) = te^t. \] (3)

4. (10 points) Section 4.2
   Find the solution to the given differential equation
   \[ y'''' - 3y''' + 4y = \left[ \frac{d}{dt} - 2 \right] \left[ \frac{d}{dt} + 1 \right] y = 0, \quad y(0) = 1, \quad y'(0) = 3, \quad y''(0) = 2. \] (4)

5. (10 points) Section 4.3
   Find a particular solution to the equation
   \[ y^{(4)} + 5y''' + 9y'' + 7y' + 2y = \left[ \frac{d}{dt} + 1 \right]^3 \left[ \frac{d}{dt} + 2 \right] y = 5e^{-t}. \] (5)

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