

MATH256-103 Homework Assignment 3 (Due Date: September 29, 2014)

Homework will be collected after the class on September 22. Late homework is admitted until 6pm on Sept. 29. Graded homework is placed in a cardboard box outside my office for one week for you to pick up. Afterwards unclaimed homework is moved to a drawer of a file cabinet near my office. Your assignments are organized in the alphabetic order of last names. For other people's convenience, please do not change this order when you pick up your assignment.

Answer all the questions below

1. Solve $y'' + 2y' + 3y = 0$, $y(0) = -1, y'(0) = 2$
2. Find the general solutions of
(a) $t^2y'' + 3ty' - 2y = 0$, (b) $2t^2y'' - 4ty' + y = 0$
3. Solve $y'' - 6y' + 9y = 0$, $y(0) = 0, y'(0) = 1$
4. Use the method of reduction to find the second solution for the following ODEs
(a) $ty'' - y' + 4t^3y = 0, y_1(t) = \sin(t^2); t > 0$, (b) $(t-1)y'' - ty' + y = 0, y_1(t) = e^t; t > 1$
5. Let y_1, y_2 be two solutions of $y'' + py' + qy = 0$. Let $y_2 = v(t)y_1$. Show that $v' = \frac{W}{y_1^2}$. Here W is the Wronskian of $\{y_1, y_2\}$.
6. Use Problem 5 to solve $t^2y'' + ty' + (t^2 - \frac{1}{4})y = 0, y_1(t) = t^{-1/2} \sin t$.