Homework Assignment 9 in MATH 308-SUMMER 2012 **due June 22, 2012**

Topics covered : *method of reduction of order; nonhomogeneous equations and method of undetermined coefficients (corresponds to sections 3.4, and 3.5 in the textbook).*

1. Given the solution $y_1(t) = t^{-3}$ of the differential equation $t^2y'' + 8ty' + 12y = 0, \quad t > 0$. Use the method of reduction of order to find a second solution $y_2(t)$ of this equation such that $\{y_1(t), y_2(t)\}$ is a fundamental set of solutions on $t > 0$.

2. (a) For each of the following equations write down the form in which a particular solution should be found according to the method of undetermined coefficients (**you do not need to find the value of the undetermined coefficient/coefficients here**):

   i) $y'' + 5y' + 6y = 3e^{-4t}$;

   ii) $y'' + 5y' + 6y = 3e^{-4t}\sin 3t$;

   iii) $y'' + 5y' + 6y = 3e^{-2t}$;

   iv) $y'' + 5y' + 6y = 3e^{-2t}\cos 10t$;

   v) $y'' - 12y' + 36y = 5e^{7t}$;

   vi)) $y'' - 12y' + 36y = 5e^{6t} - 2e^{5t}\sin 2t$;

   vii) $y'' + \omega_0^2 y = \cos\omega t$ (consider separately the case $\omega^2 \neq \omega_0^2$ and the case $\omega^2 = \omega_0^2$);

   viii) $y'' - 6y' + 25y = e^{3t}(\cos 4t - 2\sin 4t)$.

   (b) Find the general solution for equation in the item (a) ii);

   (c) Find the general solution for equation in the item (a) vii) (consider separately the case $\omega^2 \neq \omega_0^2$ and the case $\omega^2 = \omega_0^2$).