AMS 501 Homework #2

Due: 10/05/2011

1. (20 points) Find the general solutions of the following differential equations.
   (a) $y'' - 6y' + 13y = 0$;
   (b) $y^{(4)} + 2y^{(3)} + 3y'' + 2y' + y = 0$. (Hint: Expand $(r^2 + r + 1)^2$)

2. (20 points) Find a particular solution $y_p$ of the given equation using the method of undetermined coefficients:
   (a) $y' - 5y = 3e^x - 2x + 1$;
   (b) $y^{(4)} - 2y'' + y = xe^x$.

3. (30 points) Solve the following equation using the variation of parameters:
   $y'' - 2y' - 8y = 3e^{-2x}$.
   Solve it again using the method of Green’s function.

4. (10 points) Transform the following given system of differential equations into an equivalent system of first-order differential equations: $x'' = (1 - y)x$; $y'' = (1 - x)y$.

5. (20 points) Find the general solution of $x' = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 2 & 2 & 0 & 0 \\ 0 & 3 & 3 & 0 \\ 0 & 0 & 4 & 4 \end{bmatrix} x$. 

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