Fundamental Sets of Solutions
1. In the case of real, distinct roots \( r_i \neq r_j \) I made the claim that the two solutions were \( y_1(t) = e^{r_1t} \) and \( y_2(t) = e^{r_2t} \). Show that these two solutions are a fundamental set of solutions and that the general solution in this case is in fact \( y(t) = c_1 e^{r_1 t} + c_2 e^{r_2 t} \). Make sure that you clearly justify your answer.

2. Suppose that you know that \( f(x) = 2x^2 \) and \( W(f,g) = x^4e^{-3x} \). Determine the most general possible \( g(x) \) that will give this Wronskian. You may assume that \( x > 0 \) for this problem.

Undetermined Coefficients, Part I
For problems 4 – 7 use the method of undetermined coefficients to determine the general solution to the given differential equation.

3. \( 4y'' - 11y' + 6y = 10e^{2t} \)

4. \( y'' + 2y' + 37y = 20\cos(3t) \)

5. \( y'' - 16y' + 64y = 128t^2 + 16t - 4 \)

6. \( y'' - 7y' = (106t + 1)\cos(2t) \)

7. Solve the following IVP.
\[ y'' - y' - 12y = 8te^{-4t}, \quad y(0) = 0, \quad y'(0) = 6 \]