Math 23 Diff Eq: Quiz 2 (Linear 2^{nd}-order ODEs)

25 minutes, 25 points. Answer all questions, giving as much explanation as you have time for. No calculator needed; no algebra-capable ones allowed.

1. [7 points]

   (a) Write down a *general* form of the solution to $y'' - 2y' + 5y = 0$.

   (b) Compute the Wronskian of e^{-2t} and te^{-2t}. If these were solutions of an ODE of the form $y'' + p(t)y' + q(t)y = 0$, what *must* you conclude about $p(t)$?

2. [10 points] Consider $y'' + 7y' + 12y = e^{-3t}$.

   (a) Write down the corresponding *homogeneous* general solution.

(b) Use the method of undertermined coefficients to find a *particular solution*

(c) Solve the ODE given $y(0) = 2$ and $y'(0) = -7$.

(d) Imagine the right-hand side ($g(t)$ term) were changed to t^2. Write down the trial form you would choose for the particular solution [Bonus if time: solve it!]

3. [8 points] Using variation of parameters, find a particular solution to

$$y'' + 4y' + 4y = \frac{e^{-2t}}{t^2} \qquad \text{for } t > 0$$

Finally, use this to write down the *general* solution.