Due Thursday, Feb. 27 at the beginning of class.

1. Determine the longest interval in which the given initial value problem is certain to have a unique solution. Do not solve the problem.
   (a) $(1+t^2)y'' + ty' - y = \tan t$, $y(1) = y_0$, $y'(1) = y_1$.
   (b) $t(t-3)y'' + 2ty' - y = t^2$, $y(1) = y_0$, $y'(1) = y_1$.
   (c) $e^t y'' + \dfrac{y'}{t-3} + y = \ln t$, $y(1) = y_0$, $y'(1) = y_1$.
2. Find the Wronskian for the given pair of functions.
   (a) $y_1(t) = e^{3t}$, $y_2(t) = e^{-4t}$.
   (b) $y_1(t) = e^{-t}\cos(2t)$, $y_2(t) = e^{-t}\sin(2t)$.
3. If the Wronskian W of f and g is $3e^{4t}$, and $f(t) = e^{2t}$, find $g(t)$.
4. Find the general solution to the given differential equation.
   (a) $y'' + 2y' - 8y = 0$
   (b) $y'' + y' + 1.25y = 0$
5. Given that $y_1(t) = t^{-1}$ is a solution of the equation
   $$t^2y'' + 3ty' + y = 0, \quad t > 0.$$
   Find a second solution of the equation.
6. Given that $y_1(t) = \sin(t^2)$ is a solution of the equation
   $$ty'' - y' + 4t^3y = 0, \quad t > 0.$$
   Find a second solution of the equation.