**Homework: variation of parameters**          **Math 527, UNH fall 2015**
This homework will not be graded.

**Problems 1-4.** Find the general solution of the differential equation using variation of parameters. If initial conditions are given, also solve the initial value problem. The "prime" notation indicates differentiation with respect to the variable that appears on the right-hand side of the equation. (Note: most of these problems could also be solved by judicious guessing.)

**1.** $2y'' - 3y' + y = (t^2 + 1)e^{2t}$

**2.** $y'' + y = \sec t, \quad -\pi/2 < t < \pi/2$

**3.** $y'' - 3y' + 2y = te^{3t} + 1$

**4.** $3y'' + 4y' + y = e^{-t}\sin t, \quad y(0) = 1, \ y'(0) = 0$

**Problem 5.** Give short answers to the following questions.

**(a)** What property must an operator $L$ satisfy to be *linear*?

**(b)** Why is linearity important for the solution of linear differential equations?

**(c)** How many linearly independent solutions does an $n$th order linear homogeneous equation have?

**(d)** When you integrate $u_1'$ and $u_2'$ in variation of parameters, why can you always set the integration constant to zero?

**(e)** What is Euler's formula?

**(f)** How would you prove Euler's formula? Don't do the proof, just describe the proof in a sentence or two.