Math 319 - Differential Equations II
Pre-Reading Assignment # 19
due 10am Tue Nov 25th, via email

Reading The first two pages of section 11.5.

Questions No calculations involved for these! Note that the last question is a POLL. Please take a minute to register your vote!

1. We know that the functions $\phi_n(x)$ are solutions to the homogeneous BVP $L[y](x) + \mu r(x)y(x) = 0$ with boundary conditions given by equations (2). Why, then, does the expression in equation (5) not evaluate to zero?

2. In the equation for γ_n, why does
$$\int_a^b \phi^2 r dx$$
appear in the denominator?

3. In Case 1, the homogeneous BVP does not have a solution, but the nonhomogeneous BVP does. How were homogeneous and nonhomogeneous problems related when we were solving initial value problems in Math 225 (substitute whatever intro to ODEs course you took if you didn't take Math 225)?

4. In Case 2 we find that solutions exist if $\gamma_N = 0$ where γ_N is defined by the equation at the bottom of page 678. We are told that this is precisely the condition for existence of solutions (the Fredholm Alternative) that we discovered in section 11.4. In section 11.4 however, we needed to define the adjoint BVP in order to get the condition for existence of solutions. Why did we not need to do that here?

5. **POLL!!** Please tell me what you would like to do in class on Thursday:

   (a) Review for the final exam.
   - If this item is the one that you vote for, could you please tell me what you would like to see covered in such a review? Remember that I can't do very many full problems in the 80-minute class time, so it would be helpful to know from you what sort of review would be most useful. Note that I will be putting together a set of sample final exam problems that you will have a week before the final exam.

   (b) Green's functions (section 11.6).
   - Green's functions give us another way to obtain solutions to nonhomogeneous BVPs and are really important in PDE analysis. If we do cover this section, I promise that it will not appear on the final exam.