Turn in starred problems Monday 12/3/2012. Note change of day.
Section 17.7: 1 (a), (b), (c), (d), (e)*, (f)*; 2; 7
Section 17.8: $2(\mathrm{a}),(\mathrm{b})^{*},(\mathrm{~d})^{*},(\mathrm{~g}), 5^{*}$

## Comments, hints, instructions:

17.7.1:

- In (a,b,c) you should recognize by inspection that the problem will lead to one of the series studied in Section 17.4. There is no need to do any more.
- In (d) and (e) you will not be able to find the eigenvalues explicitly; give a graphical interpretation as was done in class or in Figure 3. The two problems are similar but it may be worth your time to look at both.
- Part (f) is again like one of the series from 17.4, but here because the interval is $[-1,1]$ the form of the solutions will look different. Work (f) out from the beginning, showing exactly what the eigenvalues and corresponding eigenfunctions are.
17.7.2: This is just a quick review; in fact, it is already covered by 17.7.1(a,b,c).
17.7:7: This shows that innocent looking but nonseparated boundary conditions can lead to trouble.

Exercise 17.8:2(d): This is the Legendre equation that we studied earlier (Section 4.4). The requirement that the solution be bounded at $x=1$ requires that it be one of the Legendre polynomials (see problem 3.A on Assignment 3); the boundary condition at $x=0$ picks out some of these. (These two considerations together determine the eigenvalues.) The text solution for 17.8:2(e) may be helpful. $17.8: 2(\mathrm{~g})$ is similar.
17.8:5: This is essentially the problem we encountered in studying the heat equation in a disk: a change of variables leads to Bessel's equation.

