Turn in starred problems Tuesday 12/01/2008.

Section 17.7: 7

Section 17.8: 2 (a), (b)*, (d)*, 5

Section 18.3: 6 (i), (l), (m)*, 10 (a), (c)*, (f)*, (i)

Comments, hints, instructions: 1. 17.7:7 shows that innocent looking but nonseparated boundary conditions can lead to trouble.

2. 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.

3. 17.8:5 is essentially the problem we encountered in studying the heat equation in a disk: a change of variables leads to Bessel's equation.

4. Concerning 18.3:6: we already did several parts of this problem in which the boundary conditions were homogeneous; the ones I have chosen here are inhomogeneous. You can use any method that you like, but I think that the clearest one is the method I outlined in class: Find the steady-state solution $v(x)$ of the equation and boundary conditions (the book usually calls this $u_s(x)$), so that $w(x,t) = u(x,t) - v(x)$ will satisfy a homogeneous boundary value problem which you already know how to solve.

5. 18.3:10. Here you just have to find the steady state solutions; part (c) is particularly illuminating (note that it is closely related to 18.3:6(i)). If you were asked to solve an initial value problem, you could use the steady-state to do so (method outlined in remark 3 above).