Math 462 Dr. Wolfe ASSIGNMENT #3 Due November 3, 2009

1. p. 89, Ex.4, **Strauss**.
2. p. 89, Ex. 5, **Strauss**.
3. p. 92, Ex 1, **Strauss**.
4. p. 111, Ex 2, **Strauss**. In each case use MATLAB to plot $\phi(x)$ along with the first three nonzero terms of its Fourier series.
5. Consider the initial-boundary value problem

$$u_t = ku_{xx},\ 0 < x < 1,\ t > 0,\ u(0,t) = 0,\ u(1,t) - u_x(1,t) = 0,$$

$$u(x,0) = \phi(x),\ 0 < x < 1.$$

   (a) Show that if we try to solve this problem by separation of variables, we are led to the equation

$$\lambda = \tan\lambda \tag{1}$$

   (b) Show that (1) has an infinite set of positive solutions.
   (c) Use Newton's method on a calculator or MATLAB to find the three smallest positive solutions of (1).