

### Exercise 2.2.4

In this exercise we derive superposition principles for nonhomogeneous problems.

- (a) Consider  $L(u) = f$ . If  $u_p$  is a particular solution,  $L(u_p) = f$ , and if  $u_1$  and  $u_2$  are homogeneous solutions,  $L(u_i) = 0$ , show that  $u = u_p + c_1u_1 + c_2u_2$  is another particular solution.
- (b) If  $L(u) = f_1 + f_2$ , where  $u_{pi}$  is a particular solution corresponding to  $f_i$ , what is a particular solution for  $f_1 + f_2$ ?