

### October 11 Homework Problems

1. Verify that  $y_p = 2x$  is a solution to the differential equation  $y'' + y = 2x$ . Solve the initial value problem for  $y(0) = -1$  and  $y'(0) = 8$ .
2. Solve the following initial value problem:  $y'' - 4y = e^{-2x} - 2x$ ,  $y(0) = 0$ ,  $y'(0) = 0$ .
3. Find the motion of the spring-mass system given by the differential equation  $y'' + 25y = 24 \sin t$ , with the initial conditions  $y(0) = 1$  and  $y'(0) = 1$ .
4. Solve the initial value problem  $y''' + 3y'' + 3y' + y = e^{-x} \sin x$ , with  $y(0) = 2$ ,  $y'(0) = 0$ , and  $y''(0) = -1$ .