

**Dartmouth College**  
Mathematics 23 - Assignment 15

1. Transform the equation  $y''' + xy'' - x^2y' + y = 0$  into a system of first order equations.
2. Boyce and DiPrima Section 7.1: 15
3. Boyce and DiPrima Section 7.1: 17. (Explanation of notation: When the system is in equilibrium,  $x_1 = 0 = x_2$ . The variable  $x_1$  measures the displacement of the first mass from equilibrium and thus also tells you how far the first spring is stretched from the equilibrium position. The variable  $x_2$  measures the displacement of the second mass from the equilibrium position. In particular, it is affected by the first spring as well as the second; it is *not* just a measure of how far the second spring is stretched.)
4. Boyce and DiPrima Section 7.2: 6(a)
5. Boyce and DiPrima Section 7.2: 9