MATH 1B Fall 2015
Section 17 Name: _____

Predator and prey system, second order equation.

$$\frac{dR}{dt} = kR - aRW, \quad \frac{dW}{dt} = -rW + bRW.$$

1. Populations of aphids and ladybugs are modeled by the equations:

$$\frac{dA}{dt} = 2A - 0.01AL, \quad \frac{dL}{dt} = -0.5L + 0.0001AL.$$

(a) Find the equilibrium solutions;
(b) Find an expression for dL/dA.

Solve the differential equations:

2. $y' + 4y' + 4y = 0$

3. $25y'' + 9y = 0$

4. $y'' - 4y' + y = 0$

5. $9y'' + 12y' + 4y = -, \quad y(0) = 1, y'(0) = 0$

6. $2y'' + y' - y = 0 \quad y(0) = 3, y'(0) = 3$

7. $4y'' - 4y' + y = 0 \quad y(0) = 4, y(2) = 2$

8. $y'' + 4y' + 20y = 0 \quad y(0) = 1, y(\pi) = e^{-2\pi}$