Second-Order Homogeneous Differential Equations with Constant Coefficients

1. Solve $y'' - 6y' + 9y = 0$.

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

3. Solve $y'' - 2y' + 5y = 0$.

4. (a) Solve $y'' + 2y' + 4y = 0$ with initial conditions $y(0) = 1$ and $y'(0) = 0$.

(b) Interpret part (a) in terms of a vibrating spring. What is happening to the spring as time goes on?

5. Which of the following differential equations has periodic solutions? What is the period?

(a) $y'' + 2y' - 3y = 0$.

(b) $y'' + 2y + 3y = 0$.

(c) $y'' + 4y' = 0$.

(d) $y'' + 4y = 0$.

(e) $y'' - 4y = 0$.

Does this agree with your interpretation of the differential equations in terms of vibrating springs?