Practice Exam 3

No calculators. Show your work. Clearly mark each answer.

1. Find the general solution of the following second order equation

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

2. Find the general solution of the following second order equation

$$y'' - 6y' + 34y = 0.$$

3. Find a particular solution of the following second order equation

$$y'' - 6y' + 7y = 2x + e^x.$$

4. Find a particular solution of the following second order equation

$$y'' - 5y' + 6y = xe^x.$$

5. Consider the spring-mass system whose motion is governed by

$$y'' + 6y' + 34y = 2e^{-t}.$$

   (a) Compute the solution to the above equation if $y(0) = 0$, $y'(0) = 0$.

   (b) Describe the long term behavior of the mass.

6. Find the general solution for the damped spring-mass problem

$$y'' + 4y = \sin(2t).$$

   Solve with initial conditions $y(0) = 0$, $y'(0) = 1$.