MAT 22B Problem Set 5 (Due 7/18)

1. Solve the following initial value problems, and determine the behavior of the solution as $t \to \infty$.

   (a) $y'' - 6y' + 9y = 0$, $\quad y(0) = 0$, $\quad y'(0) = 2$

   (b) $9y'' - 12y' + 4y = 0$, $\quad y(0) = 2$, $\quad y'(0) = -1$

   (c) $y'' + 4y' + 4y = 0$, $\quad y(-1) = 2$, $\quad y'(-1) = 1$

2. Solve the following differential equations given one of the solutions to the differential equaiton.

   (a) $t^2 y'' - 4ty' + 6y = 0$, $\quad t > 0$, $\quad y_1(t) = t^2$

   (b) $t^2 y'' + 3ty' + y = 0$, $\quad t > 0$, $\quad y_1(t) = t^{-1}$

   (c) $x^2 y'' + xy' + (x^2 - 0.25)y = 0$, $\quad x > 0$, $\quad y_1(x) = x^{-\frac{1}{2}} \sin(x)$