Complex roots and initial value problems

1. Find the general solution of each of the following differential equations.

    (a) $y'' - 6y' + 10y = 0$ (b) $y'' + 4y' + 6y = 0$ (c) $y^{(4)} + 8y'' + 16y = 0$

2. For each differential equation below, find a solution which matches the given initial values.

    (a) $y'' + y' = 0$ (b) $y''' + 5y'' + 4y' = 0$

    $y(0) = 2$ $y(0) = 8$

    $y'(0) = 1$ $y'(0) = -9$

                                              $y''(0) = 33$

3. Show that the following initial value problem does not have a solution.

$$y'' + y = 0$$
$$y(0) = 0$$
$$y'(\pi/2) = 1$$