Homework 7

Use the Laplace transform to solve the following initial value problems

$$y'' + 3y' + 2y = 0, \quad y(0) = 1, y'(0) = 0,$$
$$y'' - 2y' + 4y = 0, \quad y(0) = 2, y'(0) = 0,$$
$$y^{(4)} - 4y''' + 6y'' - 4y' + y = 0, \quad y(0) = 0, y'(0) = 1, y''(0) = 0, y'''(0) = 1,$$
$$y''' - y'' + y' - y = 0, \quad y(0) = 1, y'(0) = -1, y''(0) = 0,$$
$$y'' + 2y' + y = e^{-t}, \quad y(0) = 2, y'(0) = -1,$$
$$y'' - 4y' + 4y = t^3 e^{2t}, \quad y(0) = 0, \quad y'(0) = 0,$$
$$y'' + 4y = \begin{cases} t, & 0 \le t < 1, \\ 1, & 1 \le t; \end{cases} \qquad y(0) = 0, y'(0) = 0,$$
$$y'' + y' + \frac{5}{4}y = \begin{cases} \sin t, & 0 \le t < \pi, \\ 0, & \pi \le t; \end{cases} \qquad y(0) = 0, y'(0) = 0.$$