# 7.6 - Systems of Linear Differential Equations

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**Example:** Use the Laplace transform to solve the given system of differential equations.

$$\begin{matrix} \frac{dx}{dt} = 2y + e^t \\ \frac{dy}{dt} = 8x - t \end{matrix}, \qquad x(0) = 1, \quad y(0) = 1$$

$$\begin{matrix} \frac{d^2x}{dt^2} + \frac{dx}{dt} + \frac{dy}{dt} = 0 \\ \frac{d^2y}{dt^2} + \frac{dy}{dt} - 4\frac{dx}{dt} = 0 \end{matrix}, \qquad x(0) = 1, \quad x'(0) = 0, \quad y(0) = -1, \quad y'(0) = 5$$