

DEN: lab #10 (coronaversion)

1. For the initial value problem

$$\begin{aligned}y_1' &= 2y_1 - y_2 & y_1(0) &= 0 \\y_2' &= 4y_1 - 3y_2, & y_2(0) &= -3\end{aligned}$$

find

- a) a general solution of the system using elimination;
 - b) a general solution of the system using the matrix approach (eigenvalues and such);
 - c) the particular solution given by the initial conditions.
2. Find the solution of the initial value problem

$$\begin{aligned}y_1' &= 2y_1 - y_2 & y_1(1) &= 1 + 2e^3 \\y_2' &= -2y_1 + y_2, & y_2(1) &= 2 + e^3\end{aligned}$$

using the matrix approach.

3. Find a general solution of the given system

$$\begin{aligned}\dot{x}_1 &= x_1 + x_2 \\ \dot{x}_2 &= -2x_1 + 3x_2\end{aligned}$$

using the matrix approach.

4. Transform the following equations into systems of first-order linear ODEs, and for each write its matrix of the system.

a) $y''' + 3y'' - 2xy' - y = 13$;

b) $y'''' + 13y''' - 23y'' + 14y' - 13y = e^x$.