DEN Homework # 9

Solve the problems and then bring your work to the lab in the eleventh week of school.
Actually, it is a good idea to complete the first problem before the midterm in week 10.

1. Find the solution of the initial value problem
$$\begin{aligned} y_1' &= 5y_1 - 6y_2 & y_1(0) &= 5 \\ y_2' &= 2y_1 - 2y_2, & y_2(0) &= 3. \end{aligned}$$

Use the matrix approach.
Is the trivial stationary solution $y_1(x) = 0$, $y_2(x) = 0$ of this system stable?

2. Find a general solution of the system
$$\begin{aligned} y_1' &= 9y_2 \\ y_2' &= -y_1, \end{aligned}$$

Use the matrix approach.
Is the trivial stationary solution $y_1(x) = 0$, $y_2(x) = 0$ of this system stable?

3. Rewrite the equation $y''' + xy'' - y' - \ln(x)y = 13e^x$ as a system of linear equations of order 1.