

Differential Equations I for Students of Engineering Sciences

Sheet 3 (home)

Exercise 1:

Solve the following initial value problem for $x \neq 0$:

$$\frac{d}{dx} \begin{pmatrix} y_1 \\ y_2 \end{pmatrix} = \begin{pmatrix} 2 & -\frac{2}{x} \\ 0 & \frac{3}{x} \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \end{pmatrix} \quad \text{and} \quad \mathbf{y}(1) = \begin{pmatrix} 5 \\ 2 \end{pmatrix}.$$

Exercise 2:

a) Compute the general solution of the following system of differential equations

$$\dot{\mathbf{y}} = \begin{pmatrix} 5 & 1 & -1 \\ 1 & 5 & 1 \\ -1 & 1 & 5 \end{pmatrix} \mathbf{y}.$$

b) Determine the fundamental system of the system of differential equations

$$\mathbf{y}' = \begin{pmatrix} 0 & 0 & 1 \\ 4 & -3 & 0 \\ 0 & 1 & 0 \end{pmatrix} \mathbf{y}.$$

Hand in until: 26.11.2021