DIFFERENTIAL EQUATIONS (751873001, 114-1) - HOMEWORK 5

Return by November 14, 2025 (Friday) 23:59

Total marks: 50

Special requirement. All homeworks must be prepared by using LaTeX.

Exercise 1 (10 points)**.** Let

$$A = \begin{pmatrix} -2 & 1 & 0 \\ 0 & -2 & 0 \\ 3 & 2 & 1 \end{pmatrix}. \tag{0.1}$$

Compute $\exp(A)$.

Exercise 2 (10 points)**.** Solve the initial value problem $y'(t) = Ay(t) + b(t)$ with $y(0) = p$, where A is given by e(0.1),

$$b(t) = \begin{pmatrix} 2 \\ 0 \\ t \end{pmatrix}, \quad p = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}.$$

Exercise 3 (10 points)**.** Find the general solution of $y^{(4)} - y = 0$.

Exercise 4 (10 points)**.** Find the general solution of $y^{(4)} + y = 0$.

Exercise 5 (10 points)**.** Find the general solution of $y^{(4)} + 2y'' + y = 0$.