

Each group only needs to submit ONE file containing your solutions!

Problem 1. Compute e^{tA} for

$$A = \begin{pmatrix} 1 & -2 \\ 1 & 3 \end{pmatrix}$$

and express your result with real-valued functions.

- (1) using the natural fundamental set method.
- (2) using the eigen method.
- (3) Use your result of e^{tA} to solve the initial value problem

$$\frac{d\mathbf{x}}{dt} = A\mathbf{x}, \quad \mathbf{x}(0) = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

Problem 2. Consider the matrix

$$A = \begin{pmatrix} 3 & c \\ 0 & 3 \end{pmatrix}$$

where c is a real number.

- (1) Compute the eigenvalue(s) of A .
- (2) For which value(s) of c , A is diagonalizable?