

MATH 267 (Sections A3, C-1) Homework No. 8

Reading

Refer to Chapter 7 for notions of Matrix algebra.

Section 8.1 (From ‘General first-order systems’ to the end of the Section)

Section 8.4 (May omit Section on Coupled Spring-Mass system, Example 4.10 and Example 4.11)

Section 9.1

Section 9.2

Suggested Problems

Section 8.4, Problems 1,3,7,9,13,15,23, 25.

Section 9.1, Problems 1,3,17,23,25,27.

Section 9.2, Problems 7,9, 23,29,37,43, 49,57.

Problems to be handed in class (due Thursday April 7-th)

Problem 1 (10 points)

Find the solution of the system of differential equations

$$\vec{x}' = A\vec{x},$$

with

$$A := \begin{pmatrix} 1 & 1 & 1 \\ 3 & -1 & -1 \\ 0 & 0 & 1 \end{pmatrix}.$$

and initial condition

$$\vec{x}(0) = \begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix}.$$

Problem 2 (10 points)

Find the solution of the system of differential equations

$$\vec{x}' = A\vec{x},$$

with

$$A := \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}.$$

and initial condition

$$\vec{x}(0) = \begin{pmatrix} 1 \\ -1 \end{pmatrix}.$$

Problem 3 (10 points)

Find the solution of the system of differential equations

$$\vec{x}' = A\vec{x},$$

with

$$A := \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}.$$

and initial condition

$$\vec{x}(0) = \begin{pmatrix} 1 \\ -1 \end{pmatrix}.$$