

# Homework Assignment #6

(due: May 20 in class)

## Theory Part:

### Problem 1 (50%):

Consider the following initial value problem:

$$y''' + y'' - 4y' = 0 \quad 0 \leq t \leq 2$$

$$y(0) = 3; y'(0) = -1; y''(0) = 9$$

Transform this problem into a system of 3 coupled first order ODEs. (You don't have to solve it!!)

### Problem 2 (0%):

This is a reading assignment: Review Norms of Vectors and Matrices. I.e., read section 7.1.

In particular, review:

Def. 7.1, Def. 7.2, Def. 7.4, Def. 7.5, Def. 7.8 and

Theorems 7.6, 7.7, 7.9, 7.11

### Problem 3 (50%):

Do problem 2(a) of Section 7.1 in the textbook.

# HW 6, Problem 1

$$y''' + y'' - 4y' = 0 \quad 0 \leq t$$

$$y(0) = 3$$

$$y'(0) = -1$$

$$y''(0) = 9$$

Set

$$y = u_1$$
$$y' = u_2$$
$$y'' = u_3$$

$$u_1' = y' = u_2$$

$$u_2' = y'' = u_3$$

$$u_3' = y''' = -u_3 + 4u_2$$

$\Rightarrow$

$$\vec{u}' = \begin{pmatrix} u_1' \\ u_2' \\ u_3' \end{pmatrix} = \begin{pmatrix} u_2 \\ u_3 \\ -u_3 + 4u_2 \end{pmatrix}$$

with  $u(0) = \begin{pmatrix} 3 \\ -1 \\ 9 \end{pmatrix}$