

## MATH 267 (Section E1) Homework No. 9

### Reading

Sections 7.7 (up to 'diagonalizable matrices' excluded), 7.9 (Method of variation of parameters only (pg 435-437)), Section 9.1.

### Suggested Problems

Section 7.7: Exercise 1,3,11,15.

Section 7.9: Exercises 1,13,17.

Section 9.1: Exercise 1,2,13.

### Problems to be handed in in class on Monday April 23

**Problem 1** Calculate  $e^{At}$  where  $A$  is the matrix

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

**Problem 2** Solve the following boundary value problem

$$\vec{x}' = A\vec{x} + \vec{g}, \quad \vec{x}(0) = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix},$$

where  $A$  is the matrix

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

and  $\vec{g}$  the vector function

$$\vec{g} = \begin{pmatrix} t \\ 1 \\ 0 \end{pmatrix}.$$

**Problem 3** Find and classify the equilibrium points of the following system

$$\vec{x}' = \begin{pmatrix} 1 & -2 \\ 2 & 3 \end{pmatrix} \vec{x} + \begin{pmatrix} 1 \\ -2 \end{pmatrix}.$$