

## MAT 22B Extra Problem Set

1. Determine the general solution of the following system

$$\mathbf{x}' = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 1 & -1 \\ 0 & -1 & 1 \end{pmatrix} \mathbf{x}.$$

2. Determine the general solution of the following system using the method of undetermined coefficients

$$\mathbf{x}' = \begin{pmatrix} 1 & 1 \\ 4 & 1 \end{pmatrix} \mathbf{x} + \begin{pmatrix} 2 \\ -1 \end{pmatrix} e^t.$$

3. Determine the general solution of the following system using variation of parameters

$$\mathbf{x}' = \begin{pmatrix} 2 & -5 \\ 1 & -2 \end{pmatrix} \mathbf{x} + \begin{pmatrix} 0 \\ \cos(t) \end{pmatrix}.$$

4. Determine the general solution of the following system using the Laplace transform

$$\mathbf{x}' = \begin{pmatrix} 2 & -1 \\ 3 & -1 \end{pmatrix} \mathbf{x} + \begin{pmatrix} 1 \\ -1 \end{pmatrix} e^t.$$

Below are a list of problems to practice for the final exam:

- Chapter 1

- Section 1.1: 1-25
- Section 1.2: 1-14
- Section 1.3: 1-21

- Chapter 2

- Section 2.1: 1-16
- Section 2.2: 1-16
- Section 2.3: 1-21
- Section 2.4: 1-12
- Section 2.5: 1-4, 6-9, 16-22
- Section 2.6: 1-10, 14-16, 18-22
- Section 2.7: 1-17
- Section 2.8: 1-10
- Section 2.9: 1-9

- Chapter 3

- Section 3.1: 1-18
- Section 3.2: 1-9, 19-21
- Section 3.3: 1-19

- Section 3.4: 1-11, 18-22
  - Section 3.5: 1-15
  - Section 3.6: 1-15
  - Section 3.7: 3-6, 8-10
  - Section 3.8: 4-7
- Chapter 6
  - Section 6.1: 1-18
  - Section 6.2: 1-16
- Chapter 7
  - Section 7.1: 1-5, 7-9, 12, 13
  - Section 7.4: 1-6
  - Section 7.5: 1-4, 7-12
  - Section 7.6: 1-8
  - Section 7.7: 1-8 part (a) and specify initial conditions to solve IVP, 13
  - Section 7.8: 1-10
  - Section 7.9: 1-8