M427J: Differential Equations with Linear Algebra
Homework # 10
Handout: 04/11/2017, Tuesday
Due: 04/19/2017, Wednesday

• **Submission:**   Please make your homework neat and **STAPLED**. You have to submit your homework **Wednesday** in the Problem Session. Note that *no late homework will be accepted.*

• **Assignments for Section 3.6: Homogenous Linear System with Constant Coefficients (II)- Complex Eigenvalues**

In each of the following problems express the general solution of the given system of equations in terms of real-valued functions.

1. $\mathbf{x}' = \begin{pmatrix} -1 & -4 \\ 1 & -1 \end{pmatrix} \mathbf{x}$
2. $\mathbf{x}' = \begin{pmatrix} 1 & -1 \\ 5 & -3 \end{pmatrix} \mathbf{x}$
3. $\mathbf{x}' = \begin{pmatrix} 1 & 2 \\ -5 & -1 \end{pmatrix} \mathbf{x}$

• **Assignments for Section 3.7: Homogenous Linear System with Constant Coefficients (III)- Repeated Eigenvalues**

In each of the following problems find the general solution of the given system of equations.

1. $\mathbf{x}' = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix} \mathbf{x}$
2. $\mathbf{x}' = \begin{pmatrix} -\frac{3}{2} & 1 \\ -\frac{1}{4} & -\frac{1}{2} \end{pmatrix} \mathbf{x}$
3. $\mathbf{x}' = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 1 & -1 \\ 0 & -1 & 1 \end{pmatrix} \mathbf{x}$

(Hint for Prob. 3: one of the eigenvalues is -1)

• **Assignments for Section 5.1 (I): Two-Point Boundary Value Problems**

In each of the following problems, either solve the given boundary value problem or else show that it has no solution.

$$1.\ y'' + 2y = 0. \quad y'(0) = 1, \quad y'(\pi) = 0$$
$$2.\ y'' + y = 0. \quad y'(0) = 1, \quad y(L) = 0$$
$$3.\ y'' + 2y = x. \quad y(0) = 0, \quad y(\pi) = 0$$
$$4.\ y'' + 4y = \sin x, \quad y(0) = 0, \quad y(\pi) = 0$$