

HOMEWORK 8

Problem 1. For each of the following matrices, perform the following tasks:

a) compute the eigenvalues and eigenvectors and write down the general solution;

b) sketch the phase plane portrait.

$$\begin{array}{lll} 1. A = \begin{pmatrix} -6 & 3 \\ -4 & 2 \end{pmatrix} & 2. A = \begin{pmatrix} -7 & 0 \\ 0 & -7 \end{pmatrix} & 3. A = \begin{pmatrix} -2 & 4 \\ -1 & 2 \end{pmatrix} \\ 4. A = \begin{pmatrix} -3 & -2 \\ 9 & 6 \end{pmatrix} & 5. A = \begin{pmatrix} 2 & -1 \\ 1 & 4 \end{pmatrix} & 6. A = \begin{pmatrix} -5 & 2 \\ 0 & -5 \end{pmatrix}. \end{array}$$

Problem 2. For each of the following matrices, perform the following tasks:

a) classify the equilibrium point of the system $x' = Ax$ based on the position of (T, D) in the trace determinant plane;

b) compute the eigenvalues and eigenvectors and write down the general solution;

c) sketch the phase plane portrait.

$$\begin{array}{lll} 1. A = \begin{pmatrix} -16 & 9 \\ -18 & 11 \end{pmatrix} & 2. A = \begin{pmatrix} 8 & 3 \\ -6 & -1 \end{pmatrix} & 3. A = \begin{pmatrix} -3 & -9 \\ 2 & 3 \end{pmatrix} \\ 4. A = \begin{pmatrix} 6 & -5 \\ 10 & -4 \end{pmatrix} & 5. A = \begin{pmatrix} 5 & 3 \\ -4 & -2 \end{pmatrix} & 6. A = \begin{pmatrix} 2 & -5 \\ 1 & 0 \end{pmatrix}. \end{array}$$