

Math 246, Professor David Levermore
Group Work Questions for Discussion
Monday, 30 April 2018

First Set of Group Work Problems [6]

These problems are based upon Problems 4, 7 and 7 of Exam 3. You can use information from the Exam 3 Solutions.

- (1) Classify and sketch the phase-plane portrait of the system

$$\frac{d}{dt} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 & 1 \\ -4 & -5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} .$$

Determine the stability of the origin.

- (2) Classify and sketch the phase-plane portrait of the system

$$\frac{d}{dt} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -3 & 2 \\ -4 & -7 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} .$$

Determine the stability of the origin.

- (3) Classify and sketch the phase-plane portrait of the system

$$\frac{d}{dt} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 & 5 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} .$$

Determine the stability of the origin.

Second Set of Group Work Problems [4]

- (1) Classify and sketch the phase-plane portrait of the system

$$\frac{d}{dt} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2 & -1 \\ 3 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} .$$

Determine the stability of the origin.

- (2) Classify and sketch the phase-plane portrait of the system

$$\frac{d}{dt} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 & -2 \\ 8 & -5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} .$$

Determine the stability of the origin.