Differential Equations Homework 15

Due December 9

Instructions

1. Write down the names of the people you worked with.
2. Write down any resources you used other than ones that most of your classmates would be familiar with, such as Wikipedia or Wolfram Alpha.
3. Write down at the top of your submission for part 1, separately, the number of hours it took you to complete this hand-graded assignment, and the number of hours it took you to complete the corresponding Webwork.
4. Write your name, Math 217, and the homework number.
5. Hand in your homework in class.
6. You'll be handing in your solutions to parts 1, 2, and 3 to separate piles to go to separate graders. Make sure they're on separate sheets of paper.
7. Unless directed otherwise, show enough work to convince a classmate that disagrees with you that you're right and they're wrong. Answers alone will usually receive no credit.

Problems

Part 1

1. In section 5.3, do problems 18, 20, 22, 24, 26, and 28 on pages 317–318. Express your answers in a chart.

Problem	Type of critical point	Eigenvalues real or complex	Signs of real parts of eigenvalues	Eigenvectors
17	Center	Complex	Zero	

Follow these guidelines:

- If the eigenvalues are complex, you do not need to list the eigenvectors.
- If the eigenvalues have different signs, list the eigenvectors in the same order that you list the signs of the eigenvalues.
- If the eigenvalues have the same sign, list the eigenvector corresponding to the eigenvalue with the smaller absolute value first.

Part 2

2. In section 6.1, do problems 1, 3, 5, and 7 on page 380. After you determine which phase portrait corresponds to the system, use the phase portrait to determine whether each critical point is stable or unstable. If it asymptotically stable, make sure to specify that as well. Hint: The figure does not specify the direction of travel, but you can determine the direction of travel by picking an informative point (x, y) and plugging it in to the differential equations.

3. Do problems 6.1.9 and 6.1.12 on page 380. Additionally, specify whether each equilibrium is stable or unstable, and if it stable, make sure to mention if it asymptotically stable.

Part 3

4. Do problem 7.1.8 on page 445. You may assume that $s > 0$.

5. Do problem 7.1.26 on page 446.

6. Do problem 7.1.37 on page 446.

7. Do problem 7.1.38 on page 446.