MATH 336: Homework #10

Due: Tuesday, December 12, 2017

Solve the below problems concerning periodic solutions and partial differential equations. A (possibly improper) subset of them will be graded.

1. (20 points) (ES, p.155, #4) Problem 4, **parts (b) and (c) only**, in the ODE8 section of the notes (end of chapter 2). Note however that all parts are good practice for Exam 3.

2. (20 points) (ES, p.155, #5) Problem 5 in the ODE8 section of the notes (end of chapter 2).

3. (20 points) (ES, p.156-157, #9) Problem 9 in the ODE8 section of the notes (end of chapter 2).

4. (10 points) (ES, p.157, #12) Problem 12 in the ODE8 section of the notes (end of chapter 2).

Note that for all remaining problems, we consider the one-dimensional conservation of mass equation, with **advection only**, so that

$$J(x,t) = c(x,t)v(x,t), \tag{1}$$

where v is the velocity of the medium. I will begin discussing this on Thursday (12/7), but just assume this form for now, and use the equation derived with this form for J to answer the following problems.

5. (20 points) (ES, p.198, #1) Problem 1 in the PDE1 section of the notes (end of chapter 3). *Hint:* See a similar example on page 166.

6. (10 points) (ES, p.198, #2) Problem 2 in the PDE1 section of the notes (end of chapter 3). *Hint:* Is v constant here? Be careful.