

## Homework 1

Due September 8

Before writing your solutions commit yourself to being correct and clear throughout your arguments. In order to receive any credit the grader must be able to follow your arguments.

1. (30 points) Solve the following ODEs:

(a)  $(x - y)y' = x + y$

(b)  $(e^x \sin y + \tan y)dx = -(e^x \cos y + x \sec^2 y)dy$

(c)  $y^{(4)} + 2y^{(3)} + 5y'' = 3x^2 + e^{-x} \cos 2x$

(d)  $y'' + y = \ln x$ .

You may leave your answer in integral form, whenever the integral can not be explicitly computed.

2. (10 points) Problem 4 page 8.

3. (10 points) Problem 4 page 15.

4. (20 points) Problem 7 page 16.

5. (20 points) Problem 8 page 16.

6. (10 points) In a few lines write about a concept, a theorem, or a method that you learned in class so far (your choice). Describe in your own words the mathematical ideas behind it.

List one (or more) topic/concept/method which you found difficult so far.