Review problems for Exam 1

The exam 1 is on Thursday, Mar 5, in class. The exam will cover Chapter 1 (1.1-1.3), Chapter 2 (2.1-2.6), Chapter 3 (3.1-3.4). The exam will include 6 short answer problems with partial credits, and some problems without partial credits (for example, give you a differential equation, then ask you whether it is linear or nonlinear).

No calculator. You can bring one working sheet (one side only) to the exam.

You shall first read the book or note, then carefully review all homework problems.

All below review problems are given from the exercise of the book, except problems I mark as **examples** which mean problems in the lecture part of the book.

1.3: 1-4.

2.1: 1, 3, 5, 7, 9, 12(only solve equation and discuss how solution behaves as $t \to \infty$).

2.2: 1, 5, 6, 10(only solve equation).

2.3: read examples 1, 3 (mixing and chemicals in a pond) in the lecture. Change some numbers to create new problems.

2.4: 2. And read example 3(try $y' = y^{\frac{1}{2}},\ y(0) = 0$), example 4(try $y' = y^4,\ y(0) = 1$) in the lecture.

2.5: 2, 4, 6, and read all models in the book or lecture note.

2.6: 3, 7, 9, 11, 12.

3.1: 1, 3, 7, 9. (only solve the problem, and also find one or two problem to check Wronskian)

3.2: 1, 3, 4.

3.3: 5, 7, 9.

3.4: 1, 3, 9.

I suggest you to do all the problem given above. At least, you should find similar problems in the homework and read them very carefully.

Then I pick up some problems to construct a sample exam. The solutions of the sample exam will be given in the classes on Tuesday before the exam. Some other important information on the exam will also be given in this class. To encourage you to come to these this important class, I will not post the solution of the sample exam on the website.

1.3: 1-4,

2.1: 8(c),

2.2: 10(only solve equation)

2.4: Prove that the solution of $\frac{dy}{dt} = y^4,\ y(0) = 1$ fails to exists for some finite t.

Prove or disprove that solution of $y' = y^{\frac{1}{2}},\ y(0) = 0$ is unique.

2.5: 3

2.6: 12

3.1: 4, also calculate Wronskian.

3.4: 9, also calculate Wronskian.