

Review problems for Exam 1

The exam 1 is on Thursday, Feb 22, in class. The exam will cover Chapter 1 (1.1-1.3) and Chapter 2 (2.1-2.6). The exam will include 6-7 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.

The first thing you need to do is to 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, 8, 9, 10, 12(only solve equation and discuss how solution behaves as $t \rightarrow \infty$).

2.2: 1, 2, 5, 6, 7, 9, 10, 12(only solve equation).

2.3: 2. And 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: 2, 3, 7, 9, 11, 18.

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. This sample exam is a bit longer than the real exam. You should finish it in around 80 minutes. 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)

2.3: 2

2.4: Prove that the solution of $\frac{dy}{dt} = y^4$, $y(0) = 1$ fails to exist 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: 11, 18