Math 307 Week 1 Newsletter – Dr. Loveless

Every Friday, I will email the class or post a newsletter. These newsletters and emails will contain a summary of the calendar, information about homework, links to review material and studying advice. The studying advice will include old exam problems to look at each week. **It is vital that you spend some time each week reviewing homework and practice your homework stills on similar old exam problems**. If you find something helpful here, please advertise to your classmates.

UPCOMING SCHEDULE:

Friday:	Test Prep 1, Section 2.1 and 2.2 (change of variable and integrating factors)
Monday:	Section 2.2 and 2.3 (applications: A Mixing Problem, Newton's Law of Cooling)
Wednesday:	Section 2.3 (applications: Air Resistance, Bank Accounts)
Friday:	Section 2.4 (theory: existence and uniqueness of solutions, linear and nonlinear)

HOMEWORK:

HW 1 Due Wed: http://www.math.washington.edu/~aloveles/Math307Spring2016/homework.html
Read all the instructions! Ask me if you have questions.

NEW POSTING:

I will be creating many new postings each week, please take some time to look at them to see if they will help you. Here is the course website: http://www.math.washington.edu/~aloveles/Math307Spring2016/index.html
These are all original review sheets written by me. I have just written some of these so beware of typos (but I have gone through a couple edits so hopefully I caught most the typing errors).

1. **Integration!** A few students expressed deep concern to me in office hours or in email that they remember nothing about integration by parts and/or nothing about partial fractions (the two things that will be on the test prep tomorrow). For these students, I just created additional full review sheets with explanation and a lot of detail about these methods:

Full review of Integration by Parts (Check this out!)
http://www.math.washington.edu/~aloveles/Math307Spring2016/m307LaplaceIntegrationFacts.pdf
Full review of Partial Fractions (Check this out!):
http://www.math.washington.edu/~aloveles/Math307Spring2016/m307PartialFractions.pdf
Several basic examples:
http://www.math.washington.edu/~aloveles/Math307Spring2016/m307BasicIntegrationExamples.pdf

Also you can check these out**:**

Overview of all integration methods (From my Math 125 class):
http://www.math.washington.edu/~aloveles/Math307Spring2016/IntegrationTechniques.pdf
Flowchart on how to do any integral (From my Math 125 class):
http://www.math.washington.edu/~aloveles/Math307Spring2016/IntegrationTechniques2.pdf

2. **Complete summary of section 2.2 (separation of variables). Contains four fully worked out additional examples**. The last page is about change of variable which we will discuss Friday.
http://www.math.washington.edu/~aloveles/Math307Spring2016/m307Review2-2.pdf

3. **Complete summary of section 2.1 (integrating factors). Contains three fully worked out additional examples:** http://www.math.washington.edu/~aloveles/Math307Spring2016/m307Review2-1.pdf

OLD EXAMS:
Most weeks, I will also include in this newsletter several links to old exams just to encourage you to start accessing yourself on how ready you are for the exam. There are many old exams that I have personally compiled (most with solutions) in my personal Math 307 exam archive here:
http://www.math.washington.edu/~aloveles/Math307Spring2016/examarchive.html

Here is some targeted practice on the current material:

Practice for 2.2 (Separable Equations):
Problem 1(a): http://www.math.washington.edu/~aloveles/Math307Spring2016/sp15m307e1.pdf
Problem 1: http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm_1_wi14_spicer.pdf
Problem 1(a): http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm1h.pdf
Problem 1: http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm1f.pdf

Practice for 2.1 (Integrating Factors):
Problem 1(b): http://www.math.washington.edu/~aloveles/Math307Spring2016/sp15m307e1.pdf
Problem 2(b): http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm_1_wi14_spicer.pdf
Problem 2: http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm1h.pdf
Problem 2: http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm1f.pdf

Practice with change of variable:
See the last page of: http://www.math.washington.edu/~aloveles/Math307Spring2016/m307Review2-2.pdf
(Full description of method and two examples are given on last page of the review above)
See the note 2: http://www.math.washington.edu/~aloveles/Math307Spring2016/m307Review2-1.pdf
(Two more examples in note mentioned above)
See last example on last page of: http://www.math.washington.edu/~aloveles/Math307Spring2016/m307Review2-1.pdf
Problem 1(c): http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm1h.pdf
Problem 2(a): http://www.math.washington.edu/~aloveles/Math307Spring2016/midterm1e.pdf
(On problem 2(a) above, assume you are told to use the substitution $y = u\,x$, so you get $dy/dx = u + x\,du/dx$, by using the product rule. Now substitute)

General Advice:
Exam 1 is essentially about four things:

1. Solving 1st order equations (separable, integrating factor, exact, change of variable)
2. Setting up some basic applied problems (like you did in 1.1 and will do in 2.3)
3. Analyzing first order equations: theory and terminology.
4. Numerical approximation of solutions (Euler's Method)

Before we get into application, theory and analysis, you first need to be comfortable with solving. Do more than just the homework. Do extra problems from the book. Do the problems mentioned above. Do more problems from other old exams. In this way, you can take care of getting good at solving. We haven't seen the "exact" method yet, but that will be a very special method. Most of the time we will be separating or using integrating factors (and we will learn to easily identify when each is appropriate).

Once you can solve, then we spend a lot of energy on setting up applications and analysis (which we will be doing next week).

I hope this helps!

Dr. Andy Loveless