

## Math 322 Homework 1

The problems for the first assignment begin on page 3. Before beginning, please review the following expectations for homework from our [Course information sheet](#):

*Solutions.* Excellent homework solutions take many forms, but they all have the following characteristics:

- » they use complete sentences, even when formulas or symbols are involved;
- » they are written as explanations for other students in the course; in particular, they fully explain all of their reasoning and do not assume that the reader will fill in details;
- » when graphical reasoning is called for, they include large, carefully drawn and labeled diagrams;
- » they are neatly typeset using the L<sup>A</sup>T<sub>E</sub>X document preparation system. A guide to L<sup>A</sup>T<sub>E</sub>X resources is available on the course homepage.

*Recommendations.* Here are some strategies for efficiently learning from the homework assignments:

- » start early, don't wait until the night before it's due to look at it;
- » read all the problems, and identify the ones you can solve right away and the ones you can't;
- » review your notes and the book carefully; even if you paid attention in lecture, you probably didn't get all the details (I recommend doing this *before* trying to attempt the problems);
- » make an honest attempt to solve all the problems before seeking help;
- » talk to others, you can really learn from each other (make sure you don't just get the solutions from someone else, and that you are learning and understanding from this process);
- » if needed, please come to my office hours. If the posted hours are not convenient for you, then please let me know and we will make other arrangements.

*Feedback.* You will receive timely feedback from me on your homework via Gradescope. Most homework problems will be graded on a five-point scale (5 = perfect; 4 =

minor mistake; 3 = major mistake, right idea; 2 = significant idea; 1 = attempted, 0 = none of the above). *The quality of your writing will be taken into account.* If your answer is incorrect, this will be reflected in the score, and there will also be a comment indicating where things went wrong with your solution. You are strongly encouraged to engage with this comment, understand your error, and try to come up with a correct solution. You are welcome to post questions about homework problems (old and new) to our Moodle forum and talk about them with me in office hours (see the Help section).

I reserve the right to not accept late homework. If health or family matters might impede the timely completion of your homework, please contact me as early as possible.

*Collaboration.* You are permitted and encouraged to work with your peers on homework problems. It is best practice to cite those with whom you worked, and you must write up solutions independently. **Duplicated solutions will not be accepted and constitute a violation of the Honor Principle.**

*Gradescope.* Submit your solutions document as a pdf (not an image file) to Gradescope, remembering to assign each problem to page(s) in your pdf. Overleaf templates will be provided for solutions, and I encourage you to use those.

## Math 322 Homework 1

Solve the following differential equations using the methods from class. You can check your solutions with a computer, but what you turn in should be done by hand.

For each problem:

- (i) give the solution to the equation satisfying the given initial condition  $y(t_0) = I$ , and
- (ii) specify the largest open interval about  $t_0$  in which your solution is valid.

PROBLEM 1.  $y' = y^3$  with  $y(0) = -2$ .

Note: Do not leave  $y$  defined implicitly; solve for  $y$  in an interval about  $t = 0$ .

PROBLEM 2.  $y' = y \sin(t)$  with  $y(0) = 1$ .

PROBLEM 3.  $y' = \frac{3y - 2t}{t}$  with  $y(1) = 4$ .