Homework 1
Math 330
due at 5pm on Thursday, September 14, 2023

Solve the following problems and communicate your solutions clearly. Explain your work using complete sentences, and include diagrams as appropriate.

For this first homework, you must type your solutions to at least the first two problems in LATEX. You may type or write your solutions to the remaining problems. Make sure your solutions are easy to read, in order, and clearly labeled. Upload a single file containing your solutions to the Homework 1 assignment on Moodle.

1. (4 points) Read the course syllabus and answer the following questions

   (a) What sort of collaboration is appropriate in this course? What sort of "collaboration" is not appropriate?

   (b) List as many resources as you can think of (on the syllabus or not) that will help you succeed in this course.

   (c) What are three goals that you have for yourself in this course?

   (d) When are the final presentations scheduled for this course?

2. (3 points) Solve the initial-value problem: $\dfrac{dy}{dt} = 3y + 2e^{3t}$ and $y(0) = 2$.

3. (4 points) Exercise 1.5(a,b,c,d) in the text.

4. (3 points) Exercise 1.17(a,b,c) in the text. Be sure to explain your reasoning.

5. (4 points) Exercise 1.19 in the text.

6. (6 points) Solve each of the following initial-value problems. Describe the behavior of the solution $y(t)$ as $t \to \infty$ and $t \to -\infty$.

   (a) $y'' = 0,\quad y(0) = 3, y'(0) = 2$

   (b) $y'' + 2y' + y = 0,\quad y(0) = 1, y'(0) = -1$

   (c) $y'' - y' - 6y = 0,\quad y(0) = 1, y'(0) = 2$

7. (6 points) Solve each of the following boundary-value problems.

   (a) $y'' + 2y' + 2y = 0,\quad y(0) = 0, y\left(\frac{\pi}{2}\right) = 2$

   (b) $y'' + 2y' + 2y = 0,\quad y(0) = 0, y(\pi) = 0$