

Homework 2
Due Tuesday, April 16th

Instructions: write up solutions to all problems below. Neatness counts: be sure to follow guidelines for homework in the syllabus. All homework problems listed now follow the 11th edition of the textbook.

Reading Assignment: 2.1, 2.3, 2.5.

1. (Chapter 2.1, # 1, 7) (a) Using an online tool, make a slope field. (b) based on the slope field, describe the behavior of solutions for large t . (c) Solve the equation and calculate $\lim_{t \rightarrow \infty} y(t)$.

(a) $y' + 3y = t + e^{-2t}$

(b) $y' + y = 5 \sin(2t)$

2. (Chapter 2.1, # 9) Solve the initial value problem

$$y' - y = 2te^{2t}, \quad y(0) = 1.$$

3. (Chapter 2.3, # 1) Consider a tank after it has been used in an experiment. After the experiment it contains 200 L of a dye solution with concentration 1 g/L. To prepare for the next experiment, the tank is to be rinsed with clean water flowing in at a rate of 2 L/min, and the well-stirred solution will leave at the same rate. Find the time that will elapse before the concentration of dye reaches 1% of its original value.
4. (Chapter 2.3, # 2) A tank initially contains 120 L of pure water. A mixture containing a concentration of γ g/L of salt enters the tank at a rate of 2 L/min, and the well-stirred mixture leaves the tank at the same rate. Find an expression in terms of γ for the amount of salt in the tank at any time t . Also find the limiting amount of salt as $t \rightarrow \infty$.