MATH 267 (Section E1) Homework No. 1

Reading
Sections 2.1, 2.2 (may omit pg. 47), 2.3 (only Examples 1 and 2).

Suggested Problems
Section 2.1: Exercises 13, 14, 16 (use method of integrating factor)
Section 2.2: Exercises 1, 2, 6, 9, 15
Section 2.3: Exercise 1.

Problems to be handed in in class on Thursday January 18

Problem 1 Use the method of the integrating factor to solve the Initial Value Problem

\[ y' - ty = \frac{e^{t^2}}{1 + t^2}, \]
\[ y(0) = 4. \]

Problem 2 Consider the differential equation

\[ y' - 2y = g(t), \tag{1} \]

where \( g = g(t) \) is a ‘driving’ function to be determined. Assume \( y(0) = 1 \). Determine a function \( g(t) \) defined in the interval \([0, 1]\) so that the solution of (1) is such that \( y(1) = -1 \).

Problem 3 Find in implicit form the solution of the initial value problem

\[ y' = \frac{\sin(x)}{y}, \quad y\left(\frac{\pi}{2}\right) = 1. \]

Determine the interval of existence of the solution and, if possible, give an explicit form.