Written Homework 5

There are three exercises total. Textbook references: Sections 7.1 and 7.2

Exercise 1

Apply the definition of Laplace transform to find the Laplace transform $F(s)$ of the function $f(t) = 5\,t\,e^{3t} - 6$ and the domain of $F(s)$.

Exercise 2

Find the inverse Laplace transform of

$$F(s) = \frac{9+s}{4-s^2} + \frac{10}{s^3} - \frac{e^{-6s}}{s}$$

For this problem, you will have to use the table of Laplace transforms (Fig 7.1.2), but you may have to rewrite the function $F(s)$ first.

Instruction: If you need to use the unit step function (defined in Section 7.1) to do this exercise, use the same symbol as in the textbook/lecture notes.

Exercise 3

Using Laplace Transform, solve the initial value problem

$$y'' + y = \cos(3t) \quad y(0) = 0, y'(0) = 0$$

Show all work.

Optional Check: Verify that your answer is indeed the solution of the initial value problem.