Norwegian University of Science
and Technology
Institutt for matematiske fag

TMA4125 Matematikk
4N
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Exercise set 8

Exercises from Kreyszig (8th ed):

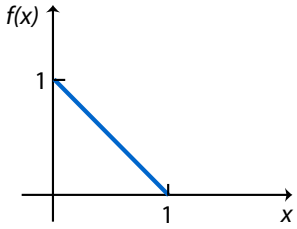
1 *Exercise 5.1.7*

Find the Laplace transform of the following function. Show the details of your work. (ω and δ are constant.)

$$\sin(\omega t + \delta)$$

2 *Exercise 5.1.9*

Find the Laplace transform of the following function. Show the details of your work.



3 *Exercise 5.1.19*

Given $F(s) = \mathcal{L}(f)$, find $f(t)$. Show the details.

$$\frac{-s-10}{s^2-s-2}$$

4 *Exercise 5.1.22*

Given $F(s) = \mathcal{L}(f)$, find $f(t)$. Show the details.

$$\frac{60+6s^2+s^4}{s^7}$$

5 *Exercise 5.1.32*

Application of the First Shifting Theorem Find the Laplace transform. (Show the details.)

$$2e^{-t}\cos^2\frac{t}{2}$$

6 *Exercise 5.1.37*

Application of the First Shifting Theorem Find the inverse transform. (Show the details.)

$$\frac{3}{s^2+6s+18}$$

7 *Exercise 5.2.3*

Initial value problems. Solve the following initial value problem by the Laplace transform. (Show the details of your work.)

$$y'+0.2y=0.01t, \quad y(0)=-0.25$$

8 *Exercise 5.2.9*

Initial value problems. Solve the following initial value problem by the Laplace transform. (Show the details of your work.)

$$y''+2y'-3y=6e^{-2t}, \quad y(0)=2, \quad y'(0)=14$$

9 *Exercise 5.2.13*

New Inverse Transforms by Integration (Theorem 3). Given $\mathcal{L}(f)$, find $f(t)$. (Show the details of your work.)

$$\frac{1}{s^2+4s}$$

10 *Exercise 5.2.19*

New Inverse Transforms by Integration (Theorem 3). Given $\mathcal{L}(f)$, find $f(t)$. (Show the details of your work.)

$$\frac{9}{s^2}\left(\frac{s+1}{s^2+9}\right)$$

Non-Kreyszig exercise:

11 Find the function $y(t)$, $t>0$ satisfying the differential equation

$$y''(t)-2y'(t)+y(t)=1, \quad t>0$$

such that $y(0)=0$ and $y(1)=10$.