

Khemis Miliana university
Faculty of Material Sciences and Computer Sciences

Level : L_2

Specialization : fundamental physics

module : Mathematics III

Semester 3

Chapter 05 : Laplace Transform

Exercise 1. Compute the Laplace transform of the following functions :

1. $f_1(t) = e^{2t}$

2. $f_2(t) = \sin(3t)$

3. $f_3(t) = t^2$

4. $f_4(t) = e^{-t} \cos(4t)$

Exercise 2. Find the inverse Laplace transform of the following functions :

1. $F_1(s) = \frac{5}{s+2}$

2. $F_2(s) = \frac{3}{s^2+4}$

3. $F_3(s) = \frac{2s}{s^2+9}$

4. $F_4(s) = \frac{s+1}{(s+1)^2+16}$

Exercise 3. Solve the initial-value problem :

$$y'(t) + 4y(t) = 8, \quad y(0) = 2$$

using the Laplace transform.

Exercise 4. Solve the initial-value problem for a damped driven oscillator using the Laplace transform :

$$y''(t) + 3y'(t) + 2y(t) = u(t-1), \quad y(0) = 0, \quad y'(0) = 0,$$

where $u(t-1)$ is the unit step (Heaviside) function shifted to $t = 1$.