

Homework #1
OPTI 370
1/12/2022
(due date: 1/19/2022)

The first assignment contains only some simple math review questions. The mathematical concepts reviewed here will be helpful throughout the course OPTI 370. Starting next week, the homework will focus on the material covered in class.

Problem 1:

Calculate the first and second time derivative of the function $f(t) = A \cos(\omega t + \varphi)$. Write the result for $\ddot{f}(t)$ in terms of $f(t)$. Plot $f(t), \dot{f}(t), \ddot{f}(t)$ over two cycles for $A = 32$, $\omega = 1.2 \text{ s}^{-1}$ and $\varphi = \pi / 4$.

(10 points)

Problem 2:

Let $z = a + jb$ be a complex number. (In this course, we use j instead of the more common notation i for the imaginary unit.) Write z as $z = r e^{j\varphi}$ and determine the magnitude and phase of z in terms of its real and imaginary parts.

(10 points)

Problem 3:

Determine the integral $I = \int_0^{\infty} dt \sin(2t) e^{j8t-5t}$

(10 points)