



Module: Electrotechnique Fondamentale 1

TD N°1: Mathematical Reminders on Complex Numbers (CN)

Exercise 01

Consider the complex number z with modulus ρ , argument θ and complex conjugate \bar{z}

A. Calculate the inverse of z for $z = 2 + j5$

B. If $z = a+jb$; What is the solution to $2z + \bar{z} = 6 + j2$

C. Put the following complex numbers in algebraic form :

$$z_1 = \frac{1-j2}{3+j} ; z_2 = \frac{(3+j5)^2}{1-j2} ; z_3 = \left(\frac{1+j}{2-j}\right)^2 + \frac{3+j6}{3-j4}$$

Exercise 02

Deduce the module and the argument of the following complex numbers and then put in trigonometric form:

$$z_1 = 1 + \sqrt{3}j ; z_2 = \sqrt{3} + j ; z_3 = 27$$

Exercise 03

Use Euler's formulas to transform the following expression into a sum

$$f(x) = \sin(2x) \cdot \sin(x)$$

$$F(x) = \sin^2(x) ;$$

Exercise 04

A dipole carries a current $i(t) = 2\sqrt{2}\sin(314t + 6\pi)$ when subjected to voltage

$$u(t) = 220 \sin(314t)$$

- Determine the impedance of this dipole.