MNS Department
Fall Semester 2024
Course Title:Mathematics for Machine learning and Signal Processing
Course ID: MAT 215
Assignment #1
Section:4

Lecture Modules:Complex Number

- Different representation of Complex Number
- Basic Algebraic operations with Complex Number

0.1 Questions

1. Show that, $\left(1+\sqrt{3}i\right)^{-10} = 2^{-11}\left(-1+\sqrt{3}i\right)$
2. Show that if $|z| \leq 1$ then $\left|Re(2+\bar{z}+z^3)\right| \leq 4$
3. Establish the identity,$1+z+z^2+...+z^n = \dfrac{1-z^{n+1}}{1-z}$ and then use it to derive Lagrange's trigonometric identity:
   $1+\cos\theta+\cos 2\theta+...\cos n\theta = \frac{1}{2}+\dfrac{\sin(2n+1)\dfrac{\theta}{2}}{2\sin\dfrac{\theta}{2}}, \quad 0<\theta<2\pi$
4. Find the indicated roots and locate them graphically: $(-4+4i)^{\frac{1}{5}}$
5. If $z_1 = 4-3i, \quad z_2 = -1+2i$ obtain analytically: $|2\bar{z}_1 - 3\bar{z}_2 - 2|$