MNS Department
Spring Semester 2023
Course Title:Mathematics for Machine Learning and Signal Processing
Course ID: MAT 215
Assignment #1
Section:3,4,6,9

Lecture Modules:Complex Number

- Complex number system, Different representation of complex number,Fundamental operations with complex number,
- De Moivre's theorem
- Roots of 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. Prove that for $m = 2, 3, \cdots,\ \sin\frac{\pi}{m}\sin\frac{2\pi}{m}\sin\frac{3\pi}{m}\sin\frac{4\pi}{m}\sin\frac{5\pi}{m}\cdots\sin\frac{(m-1)\pi}{m} = \frac{m}{2^{m-1}}$
4. Find the indicated roots and locate them graphically: $(-4+4i)^{\frac{1}{5}}$
5. If $z_1 = 4-3i,\ \ z_2 = -1+2i$ obtain graphically and analytically: $|2\bar{z}_1 - 3\bar{z}_2 - 2|$