

Math 4001 Analysis 2
Homework Set 1

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Problem 1: Prove that multiplication in \mathbb{C} satisfies associativity, and that the distributivity law is satisfied. (4P)

Problem 2: Compute the following complex numbers and represent them in the form $a + bi$ with $a, b \in \mathbb{R}$:

a) $(1 + i)^4$ b) $\left(\frac{-1-\sqrt{3}i}{2}\right)^3$ c) $\frac{2-i}{2-3i}$ d) $\frac{(1+i)^5}{(1-i)^3}$ (4P)

Problem 3: Compute the following limits:

a) $\lim_{n \rightarrow \infty} \frac{i^n + 5^n}{1 + 5^n}$ b) $\lim_{n \rightarrow \infty} \sum_{n=0}^{\infty} \left(\frac{i}{2}\right)^n$ (4P)

Problem 4: Determine all zeros of the polynomial

$$x^5 - x^4 + 2x^3 - 2x^2 + x - 1.$$

(4P)