MAT 514 - Summer II 2020
July 16, 2020

Long Quiz 1

Problem 1 Determine the real and imaginary parts[1] of the complex number

$$z = \frac{3i + 2}{12 + 5i}$$

Problem 2 Find the conjugate, norm, and polar angle of the complex number

$$z = \frac{4}{\sqrt{3} - i}$$

[1] We will use the symbols $\Re(z), \Im(z)$ for the real and imaginary parts of a complex number z, respectively.

Problem 3 Sketch the set

$$\{z \in \mathbb{C} | \Re(z^2) \leq 0\}$$

in the complex plane. Determine its basic topological properties: is it open, closed, or neither; bounded; compact; connected?

Problem 4 Determine whether the limit below exists:

$$\lim_{z \to (1-i)} \Re(z) + i(2\Re(z) + \Im(z)).$$

If it exists, compute it. Otherwise, explain why it does not exist.