

18.03SC Practice Problems 6

Complex numbers

1. Mark $z = 1 + \sqrt{3}i$ on the complex plane. What are its polar coordinates? Then mark z^n for $n = 1, 2, 3, 4$. What is each in the form $a + bi$? What is each one in the form $Ae^{i\theta}$? Then mark z^n for $n = 0, -1, -2, -3, -4$.
2. Find a complex number $a + bi$ such that $e^{a+bi} = 1 + \sqrt{3}i$. In fact, find all such complex numbers. For definiteness, fix b to be positive but as small as possible. (This is probably the first one you thought of.) What is $e^{n(a+bi)}$ for $n = 1, 2, 3, 4$? (Hint: $e^{n(a+bi)} = (e^{a+bi})^n$.) How about for $n = 0, -1, -2, -3, -4$?

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