Complex Variables, MATH 4337/5337, Fall 2024

Homework 3: Sections 1.7. Products and Powers in Exponential Form, 1.8. Arguments of Products and Quotients, 1.9. Roots of Complex Numbers

Due Saturday, February 10 at 11:59 pm

Write in complete sentences!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the textbook or hypotheses. The exercise numbers are based on the 9th edition of the textbook.

1.9.5. By writing the individual factors on the left in exponential form, performing the needed operations, and finally changing back to rectangular coordinates, show the following. Write in complete sentences, explain what you are doing, and don't just give a bunch of computations.

(a) $i(1-\sqrt{3}i)(\sqrt{3}+i) = 2(1+\sqrt{3}i)$.

(b) $5i/(2+i) = 1+2i$.

(d) $(1+\sqrt{3}i)^{-10} = 2^{-11}(-1+\sqrt{3}i)$.

1.9.6. Show that if $\mathrm{Re}(z_1) > 0$ and $\mathrm{Re}(z_2) > 0$, then $\mathrm{Arg}(z_1 z_2) = \mathrm{Arg}(z_1) + \mathrm{Arg}(z_2)$.

1.11.3. Find $(-8-8\sqrt{3}i)^{1/4}$, express the roots in rectangular coordinates, exhibit them as the vertices of a square, and point out which is the principal root. Write in complete sentences and explain what you are doing.