

Complex Analysis 1, MATH 5510, Fall 2023

Homework 7, Section IV.2. Power Series Representations of Analytic Functions

Due Saturday, November 4 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. Do not discuss homework problems with others. If you have any questions, then contact me (gardnerr@etsu.edu).

IV.2.5. Give the power series of the principal branch of the logarithm, $f(z) = \log z$, about $a = i$ and find its radius of convergence. Use Theorem IV.2.8.

IV.2.6. Give the power series for the principal branch of $f(z) = \sqrt{z}$ about $a = 1$ and find its radius of convergence. Use Theorem IV.2.8.

IV.2.7(d) and 9(a). Evaluate $\int_{\gamma} \frac{\log z}{z^n} dz$ where $\gamma(t) = 1 + e^{it}/2$ for $t \in [0, 2\pi]$, and $n \geq 0$. Assume that $\log z$ is the principal branch of the logarithm.

Evaluate $\int_{\gamma} \frac{e^z - e^{-z}}{z^n} dz$ where $n \in \mathbb{N}$ and $\gamma(t) = e^{it}$ for $t \in [0, 2\pi]$.