

Problem Set 4A: Assignment 4

Instructor: El Mehdi Ainasse
MAT 342 – Applied Complex Analysis
Summer Session II 2019

DUE: August 8th, 2019 – AT THE BEGINNING OF CLASS.

Exercise 0. Review everything you've studied this week before proceeding!

Exercise 1. Evaluate $\int_{\gamma} \frac{dz}{1+z^2}$ where γ is a circle of radius 2 and center 0.

Exercise 2. Evaluate

$$\int_{\gamma} \frac{z^2 + e^z}{z(z-3)} dz$$

where γ is the unit circle.

Exercise 3. Suppose that $|z| \leq 2$. Prove that the series

$$\sum_{n=1}^{\infty} \frac{2z^2}{n^2 + |z|}$$

converges absolutely.

Exercise 4. Suppose that $f(z) = \sum_{n=0}^{\infty} a_n z^n$ is convergent on some disk $\{|z| < R\}$ where $R > 0$. Suppose also that $f(z) = f(-z)$. Show that $a_n = 0$ for odd values of n ; i.e. for $n = 1, 3, 5, 7, \dots$.

Exercise 5. Let $f(z) = \frac{z^2 - 1}{\cos(\pi z) + 1}$ have the series expansion $\sum_{n=0}^{\infty} a_n z^n$ near $z = 0$. Compute a_0 , a_1 and a_2 .