

J. of Ramanujan Society of Mathematics and Mathematical Sciences
Vol. 10, No. 1 (2022), pp. 173-184

DOI: 10.56827/JRSMMS.2022.1001.15

ISSN (Online): 2582-5461

ISSN (Print): 2319-1023

EXPANDING THE LAURENT SERIES WITH ITS APPLICATIONS

Ganesh Prasad Adhikari

Central Department of Mathematics Education,
Tribhuvan University, NEPAL

E-mail : gpadhikarin@gmail.com

(Received: Sep. 22, 2022 Accepted: Nov. 20, 2022 Published: Dec. 30, 2022)

Abstract: In Nepal, there are many mathematics subjects taught at university level. Among them, complex analysis is the most powerful. In complex analysis, the Laurent series expansion is a well-known subject because it may be used to find the residues of complex functions around their singularities. It turns out that computing the Laurent series of a function around its singularities is an effective way to calculate the integral of the function along any closed contour around the singularities as well as the residue of the function. Learning the Laurent series concepts can be difficult, and many students struggle to develop adequate understanding, reasoning, and problem-solving skills. Therefore, this article presents multiple practical examples where the Laurent series of a function is found and then utilized to compute the integral of the function over any closed contour around the singularities of the function, based on the theory of the Laurent series.

Keywords and Phrases: Laurent series, integral, contour, applications, singularities.

2020 Mathematics Subject Classification: 65E05.

1. Introduction

The Laurent series expansion method is a vital tool in complex analysis. A Laurent series can only be used to work around a complex function's singularities. To accomplish this, we must first identify the function's singularities. Based on these singularities, we can then build a number of concentric rings, each with the same center z_0 , and, in the case where the function is analytical, we can then obtain