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A STUDY OF VALUES OF A MEROMORPHIC FUNCTION WITH DERIVATIVES

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ABSTRACT

A meromorphic function is a complex function that is holomorphic (analytic) except at isolated singular points, where it exhibits poles but no essential singularities. The study of the values of a meromorphic function along with its derivatives offers deep insights into the behavior of complex functions. Meromorphic functions, like holomorphic functions, are governed by the principles of complex analysis, but the presence of poles introduces unique characteristics. When examining the values a meromorphic function takes, one often looks at its zeros, poles, and the critical points (where the derivative vanishes). The derivatives of a meromorphic function play a key role in determining the nature of these critical points and understanding how the function behaves near singularities. By studying the zeros of the derivative, one can locate the critical points, which are pivotal in determining where the function exhibits local maxima, minima, or saddle points in its real and imaginary components. Additionally, Nevanlinna theory, a branch of value distribution theory, deals with the distribution of values of meromorphic functions and their derivatives, offering tools to understand how often a function or its derivative takes certain values. These explorations help in advancing fields like differential equations and complex dynamical systems.