

# On the Location of the Zeros of a Polynomial

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## ABSTRACT

In this paper, we obtain a conclusion on where all the zeros of polynomial

$$P(z) = a_n z^n + a_{n-3} z^{n-3} + \dots + a_1 z + a_0$$

where  $z$  is a complex variable and  $a'_k$ s are the complex coefficients, are located. Precisely, a Ring-shaped region containing all the zeros of polynomial  $p(z)$  has been given. In conclusion, along with a few other results that were based on the original Cauchy's work, sharpens some previously well-known results. Numerous results in this direction have been extended, including various known extensions and generalizations of Cauchy's classical result. This extension is achieved in a fairly uniform manner, enclosing a range of related outcomes. This research not only advances theoretical knowledge but also holds practical implications for fields where polynomial roots play a crucial role. Furthermore, through examples, we demonstrate that our findings offer more insightful information on the roots of polynomials compared to existing results.

**Keywords:** Polynomials; Zeros; Ring-shaped region

## How to Cite

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