

NEW GENERALIZATION OF CHEBYSHEV-LIKE POLYNOMIALS AND THEIR APPLICATIONS

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Abstract: This study is focused on the development of a new generalized version of four known types of Chebyshev polynomials. We come up with four different kind of generalized Chebyshev polynomials using a modified recurrence relationship with different starting points. We also get Binet's formula for generalized Chebyshev's polynomials. The Binet formula is obtained by mathematical induction. The matrix representation and the characteristic equation are presented using matrix algebra properties for these polynomials. We also explore about the sum, products, and subtraction of the roots of the characteristic equation of the generalized Chebyshev polynomials. Finally, we have shown how Chebyshev-like polynomials can be used in practice with examples.

Keywords and Phrases: Generalized Chebyshev polynomials, Recurrences Relation, Binet-Like Formula, Matrix Representation, Characteristic Equations.

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1. Introduction

Chebyshev polynomials occupy prominent attention because of their substantial use in mathematics. This study is very useful in the theoretical as well as practical aspects of mathematics like in approximation theory. The authors Gultekin and Betul Sakiroglu, conducted a study on the analysis of Chebyshev generalized polynomials forms using matrixes and combination forms [14]. Akmak and Uslu, developed a generalized version of all four Chebyshev polynomials. Additionally, they