

On the solvability of certain classes of Heun equation and their associated orthogonal polynomials

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The present work analyzes the constraints on some classes of Heun type equation to admit polynomial solutions. The necessary and sufficient conditions for the existence of these polynomials are discussed. A three-term recurrence relation is provided to generate the polynomial solutions explicitly. We, then, prove that these polynomial solutions are a source finite sequences of orthogonal polynomials. Several properties, such as the recurrence relation, Christoffel-Darboux formulas and the moments of the weight function, are discussed. We also show a factorization property of these orthogonal polynomials that allow for the construction of other sequences of orthogonal polynomials.