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Exploring Hermite interpolation polynomials using recursion.

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Summary: Summary. In this paper we consider the teaching of Hermite interpolation. We propose here two nonstandard approaches for exploring Hermite interpolation polynomials in a computer supported environment. As an extension to the standard construction of the interpolation polynomials based on either on the fundamental polynomials or the triangular shaped divided difference table, we first investigate the generalization of the Neville type recursive scheme which may be familiar to the reader or to the student from the chapter about Lagrangian interpolation. Second, we propose an interactive demo tool where by the step-by-step construction of the interpolation polynomial, the interpolation constraints can be considered in an almost arbitrary order. Thus the same interpolating polynomial can be constructed in several different ways. As a by-product, one can also ask an interesting combinatorial problem from the students about the number of compatible orders of the constraints depending on the cardinality of node system.

Classification: N55 U75

Keywords: Hermite interpolation; Neville's recursion; divided differences; linear algebra; interpolation sequence; enumeration; computer supported learning environment; Mathematica