

Symbolic calculation behind floating-point arithmetic using CAS

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In this talk we would like to present using CAS, some examples of symbolic calculations which lie behind calculations in floating-point arithmetic (with double precision). Each operation in floating-point arithmetic is performed according to a precise-symbolic algorithm. In spite of the fact that floating point arithmetic is based on symbolic operations, it gives approximate results with some exceptions, e.g.: adding, subtracting and multiplying integers; adding, subtracting, multiplying and dividing negative integer powers of 2. We will present in this talk simple examples in Mathematica and wxMaxima where the result of operations may depend on the interpretation of the user input data (numbers) by CAS functions (such as Solve, Limit, Det, solve, limit, det) – as symbolic or approximate. The result may also depend whether these CAS functions use more or less clever algorithms.

Keywords

Higher education, Floating Point Arithmetic, Application of CAS, Mathematica, Mathematical didactics

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