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An analytical framework for categorizing the use of CAS symbolic manipulation in textbooks.

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Summary: The symbolic manipulation capabilities of computer algebra systems, which we refer to as CAS-S, are now becoming instantiated within secondary mathematics textbooks in the United States for the first time. While a number of research studies have examined how teachers use this technology in their classrooms, one of the most important factors in how this technology is used in the classroom is how it is embedded within curricular resources such as textbooks. This study introduces readers to an analytical framework for examining CAS-S within textbooks and presents the results of its application to three secondary U.S. mathematics textbook units involving polynomial functions. The framework consists of two components: application of CAS-S and reflection on CAS-S uses. The analyses identified differences among the three textbook units in pedagogical intent and task connectedness involving CAS-S. The majority of CAS-S tasks were coded as involving low procedural complexity and there were few instances in which the technology was used in the construction of proofs. Textbook developers asked students to reflect on the visible CAS-S result as opposed to the invisible process leading to those results. The implications of these results as well as the potential transformative role of CAS-S are discussed.

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