

Short lecture

## **Differences between Expected Answers and the Answers Given by Computer Algebra Systems to School Equations**

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### **Abstract**

Equation solving is an important part of school mathematics curricula. Equations are also important in the use of Computer Algebra Systems (CAS). Sometimes a CAS offers an answer that is somewhat different from the answer that is probably expected by the student or teacher. (The customs and requirements for answers can also differ between regions or even teachers.) The expected answer and the answer offered by a CAS could be equivalent or non-equivalent. The gap between the answers could be bridgeable in an instructive manner. These (somewhat unexpected) answers could serve as a catalyst for rich mathematical discussion (see (Pierce and Stacey, 2010)).

In this study, over 60 equations (linear, quadratic and fractional equations, equations that contain an absolute value of an expression, irrational, exponential, logarithmic, trigonometric and literal equations) were solved using different CAS. Many answers offered by the CAS coincide with the expected answers. This paper focuses on the answers that deviated from expectations in some form. We considered the following questions in case of each of those answers: Is the answer offered by a CAS equivalent to the answer required at school? Would it be easy for a student, working manually, to transform the answer into the required form? How about if the student uses a CAS? In this context it is important to analyze potential instructiveness such situations. What issues could be raised for discussion? Some of them seem to be relevant in a school context: for example, the properties of different functions (like square root, logarithmic or trigonometric functions). Some issues, e.g., pertaining to infinity, could be beyond the regular school level.

The aim is to present a spectrum of possible differences and to highlight the situations (equations, CAS) in which a particular type of discrepancy could occur.

Pierce, R. and Stacey, K. (2010). Mapping pedagogical opportunities provided by mathematics analysis software. *International Journal of Computers for Mathematical Learning*, 15(1), 1–20.