Questions and ideas from deceased colleagues that help us carry on

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Abstract

Having been involved, over the past 30 years, in several conferences on the use of computer algebra systems in mathematics education (notably, the TIME, USACAS, T^{3}IC conferences and the Education session of the ACA conferences), I have met several colleagues from whom I have learned a lot. The recent unexpected deaths of some of them, within only 15 months of each other, have upset many of us. An original way to honor their memory is to show how, starting from their personal mathematical concerns – quite different – this can lead to an attempt to answer the following question: how, surrounded today by all this technology and artificial intelligence, can we continue to teach mathematics to the current clientele of students? The examples presented will be for some mathematics courses that engineering students must take.

1 Introduction

Imagine, in the middle of spring 2023, José Luis Gálan García informs us of the death of Eugenio Roanes-Lozano, barely 60 years old and in perfect health. A few months later, David Jeffrey writes to me that he and David Stoutemyer are doing everything they can to recover Rubi's files since Albert Rich, diagnosed with Creutzfeldt -Jakob disease, only has a few days to go. And in the summer of 2024, Josef Böhm – who had participated in ACA 2023 in Warsaw – dies of cancer that he had courageously fought for several years.

A beautiful tribute to Eugenio-Roanes Lozano, professor at Complutense University of Madrid who passed away on April 16, 2023, was from Michael Wester : in fact, the Computer Algebra in Education session of ACA 2023 was dedicated to Eugenio. Among his many publications in symbolic computation, education, and transportation engineering, I must mention his very last presentation during the online session of ACA2021 and the paper [1]. If Eugenio asked the question of whether one can bring one's calculator to class, thinking mainly of an elementary or secondary school class, the same question arises at the university level — especially in an engineering school. ÉTS requires each of its undergraduate students to purchase a symbolic calculator (TI-Nspire CX

II CAS), which also comes with the computer software version. It is therefore in our own context that we will attempt to answer the question posed by Eugenio.

I will always remember how lucky I was when Albert Rich, who came to an ACA conference on a rare occasion (ACA2001 in Albuquerque), showed me how the next version of *Derive* was to contain a "Show Step Simplications" for the computation of indefinite integrals. With the end of *Derive* in 2007, Albert continued this work for 15 years in the framework of his Rule-based Integrator system Rubi. Almost 40 years of presence on the market of computer algebra systems have not succeeded in changing the integral tables in calculus textbooks. By showing some rules of Rubi (via Mathematica), we will try to show that Eugenio's question makes sense if we adapt our way of presenting integration techniques to the Rubi way. Sadly, Albert's passing on August 11, 2023, came suddenly and put an end — at least for now — to a future version of Rubi.

The Education session of the ACA 2025 conference is dedicated to Josef Böhm. The website session contains a link that describes Josef's involvement well. Josef taught in Austria for many years in secondary schools and the use of technology was at the very heart of the concerns of the *Austrian Center for the Didactics of Computer Algebra* (ACDCA). Publishing the *Derive Newsletter* (DNL) from 1991 until his death showed that Josef was a proud user of technology and that he saw no contradiction between its use and paper and pencil. Josef was very interested in using graphs, sliders and iterations to illustrate many concepts, but it was questions about symbolic computation that led to several email exchanges over the past few years. Especially about symbolic integration!

References

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