COMPUTER ALGEBRA ALGORITHMS

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INTRODUCTION

The origins of the discipline of computer algebra can be found in Isaac Newton's *Universal Arithmetic* (1728), where methods for manipulating universal mathematical expressions (i.e. formulas containing symbolic indeterminates) and algorithms for solving equations built with these expressions are systematically discussed. One can interpret the mission of computer algebra as the construction of computer systems that enable scientific or engineering users, for instance, to carry out mathematical manipulation automatically. Indeed, systems with this goal already exist, among them MACSYMA, MAPLE, muMATH, REDUCE, SAC/2, SCRATCHPAD/II, and SMP. These systems carry out scientific computing tasks, whose results are distinguished from numerical computing in two principal aspects. (*a*) The results are symbolic rather than numerical, as the typical example of the inversion of a symbolic matrix demonstrates.

$$\text{FACTOR}\left(\begin{bmatrix} 1 & x_1 & x_1^2 & x_1^3 \\ 1 & x_2 & x_2^2 & x_2^3 \\ 1 & x_3 & x_3^2 & x_3^3 \\ 1 & x_4 & x_4^2 & x_4^3 \end{bmatrix}^{-1}\right) \rightarrow \qquad 1.$$

$$\begin{bmatrix} \dfrac{x_2 x_3 x_4}{(x_2-x_1)(x_3-x_1)(x_4-x_1)} & \dfrac{-x_1 x_3 x_4}{(x_2-x_1)(x_3-x_2)(x_4-x_2)} & \dfrac{x_1 x_2 x_4}{(x_3-x_1)(x_3-x_2)(x_4-x_3)} & \dfrac{-x_1 x_2 x_3}{(x_4-x_1)(x_4-x_2)(x_4-x_3)} \\[2ex] \dfrac{-x_2 x_4 - x_3 x_4 - x_2 x_3}{(x_1-x_1)(x_3-x_1)(x_4-x_1)} & \dfrac{x_1 x_4 + x_1 x_4 + x_3 x_3}{(x_2-x_1)(x_3-x_2)(x_4-x_2)} & \dfrac{-x_1 x_4 - x_1 x_4 - x_1 x_2}{(x_3-x_1)(x_3-x_2)(x_4-x_2)} & \dfrac{x_2 x_1 + x_1 x_3 + x_1 x_2}{(x_4-x_1)(x_4-x_2)(x_4-x_3)} \\[2ex] \dfrac{x_2 + x_3 + x_4}{(x_1-x_1)(x_3-x_1)(x_4-x_1)} & \dfrac{-x_1 - x_3 - x_4}{(x_2-x_1)(x_3-x_2)(x_4-x_2)} & \dfrac{x_1 + x_2 + x_4}{(x_3-x_1)(x_3-x_2)(x_4-x_2)} & \dfrac{-x_1 - x_2 - x_3}{(x_4-x_1)(x_4-x_2)(x_4-x_3)} \\[2ex] \dfrac{-1}{(x_2-x_1)(x_3-x_1)(x_4-x_1)} & \dfrac{1}{(x_2-x_1)(x_3-x_2)(x_4-x_2)} & \dfrac{-1}{(x_3-x_1)(x_3-x_2)(x_4-x_2)} & \dfrac{1}{(x_4-x_1)(x_4-x_2)(x_4-x_3)} \end{bmatrix}$$

Algorithms For Computer Algebra

James Harold Davenport,Y. Siret,E. Tournier

Algorithms For Computer Algebra:

Whispering the Techniques of Language: An Psychological Quest through **Algorithms For Computer Algebra**

In a digitally-driven world where monitors reign supreme and immediate communication drowns out the subtleties of language, the profound secrets and psychological nuances concealed within words often get unheard. However, situated within the pages of **Algorithms For Computer Algebra** a fascinating literary value blinking with raw emotions, lies an exceptional quest waiting to be undertaken. Composed by a talented wordsmith, this wonderful opus invites visitors on an introspective trip, delicately unraveling the veiled truths and profound impact resonating within the very fabric of each and every word. Within the emotional depths of the moving evaluation, we can embark upon a sincere exploration of the book is primary styles, dissect its interesting writing model, and fail to the strong resonance it evokes heavy within the recesses of readers hearts.

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