

Introduction of Mathematical Formulae in REDUCE System

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Abstract

The formula manipulation system REDUCE (Ver. 3.3) can be used in many computer centers by TSS conversation. It serves the useful tool in many branches of theoretical sciences. In this paper we report some examples of REDUCE TSS conversations which show the difficulty and its resolution in the use of mathematical formulae (identities) in REDUCE language, in particular, with respect to INT (integration) command.

§ 1. Introduction

The formula manipulation system REDUCE (Ver. 3.3) [1~6] can be used in many computer centers by TSS. It serves the useful tool in many branches of theoretical sciences. It offers such computational methods as [2] :

- 1) expansion and ordering of polynomials and rational functions,
- 2) substitutions and pattern matching in a wide variety of forms,
- 3) automatic and user controlled simplification of expressions,
- 4) calculations with symbolic matrices,
- 5) arbitrary precision integer and real arithmetic,
- 6) facilities for defining new functions and extending program syntax,
- 7) analytic differentiation and integration,
- 8) factorization of polynomials,
- 9) Dirac matrix calculations of interest to high energy physicists.

In this article we argue concerning with 3) and 7) among these.

Mathematical formulae can globally be introduced in REDUCE system by using FORALL ...LET... command with some care. First we note the following rule of REDUCE language [5].

Conditions in substitution command :

- (a) $F1 * F2 = \dots$ this form is allowed.

$F1 + F2 = \dots$, $F1 - F2 = \dots$, $F1 / F2 = \dots$, these forms are not allowed.

- (b) $F(X + Y) = \dots$, $F(X * Y) = \dots$, these forms are allowed. However we can not use symbols $+$, $-$ in the form of multi-term operator for more than two terms. Therefore the

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