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(a) What is algebraic expression? How does it differs from mathematical formula?

An algebraic expression is an expression built up from integer constants, variables, and the algebraic operations (addition, subtraction, multiplication, division, and exponentiation by an exponent that is a rational number)

Algebra expression also introduces the concept of variables, which allows an unknown quantity to be represented by a single letter, hence the convenience of manipulation in applications.

A mathematical formula shows the relationship between two or more variables, is a calculation for a specific purpose and is always true, subject to certain conditions, no matter the inputs.

(b) What is term rewriting? Is it the same as symbolic computation?

Rewriting is a method of replacing subterms of a formula (Well-formed formula) with other terms.

Symbolic computation is capable of performing operations, like simplification of expressions, differentiation using chain rule, polynomial factorization, indefinite integration, etc.

(c) What is symbolic computation comparing with numerical computation?

Symbolic computation is an exact computation with expressions containing variables with no given value and manipulated as symbols. Contrary to numerical computation, which uses numerical approximations.

(d) What is the difference between evaluation and interpretation (in math sense)?

An evaluation is the completion of a mathematical operation by finding the value of the expression when the variable is replaced by a given number.

Interpretation gives a value (meaning) to mathematical expression (symbols, formulas, etc.) In mathematics, such values are mathematical objects (sets, operations, expressions, etc.). The value itself is called an interpretation of the corresponding expression.

(e) What is lazy evaluation comparing with eager evaluation?

Lazy evaluation is an evaluation strategy that holds the evaluation of an expression until its value is needed.

Comparing with eager evaluation, lazy evaluation allows the language runtime to discard sub-expressions that are not directly linked to the final result of the expression.

Lazy evaluation also allows faster computations and enable the programmer to access components of data structures out-of-order after initializing them, as long as they are free from any circular dependencies.

(f) How functional programming related to algebra systems?

Functional programming is related to algebra system since it allows various math expressions to be used in different locations, without any side effect. Evaluating the expression or evaluating the function will be the same using the same parameters

(g) Is lambda function in Python a replacement for symbolic computation? If yes, why? If not, why not? Provide at least two examples.

Lambda function in Python is very similar to symbolic computation. However, a lambda function is not a replacement of symbolic computation since the lambda functions woks substituting values for simples.