Problem #69

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Summary: What is the syntactic type of (mid-, three-way) distributivity?

What is the syntactic type (maximum number of top-level steps needed in an equational proof [BC92]) of the distributivity axiom? What is the syntactic type of "three-way" commutativity:

$$f(x,y,z) = f(x,z,y) = f(y,x,z) = f(y,z,x) = f(z,x,y) = f(z,y,x)$$
$$f(f(x,y,z),u,x) = f(x,y,f(z,u,x))$$

What are the unification type, decidability, and syntactic type of "mid-commutativity": $(x+y)+(u+v) = (x+u)+(y+v)$?

Bibliography

[BC92] Alexandre Boudet and Evelyne Contejean. On n-syntactic equational theories. In H. Kirchner and G. Levi, editors, *Proceedings of the Third International Conference on Algebraic and Logic Programming*, volume 632 of *Lecture Notes in Computer Science*, pages 446–457, Pisa, Italy, September 1992. Springer-Verlag.