

Computer algebra analysis of tree-like sentences

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A *sentence* over a finite alphabet A , is a finite sequence of non-empty words over A . More generally, we define a *graphical sentence* over A by attaching a non-empty word over A to each arrow and each loop of a connected directed graph (digraph, for short). Each word is written according to the direction of its corresponding arrow or loop. Graphical sentences can be used to encode sets of sentences in a compact way: the *readable sentences* of a graphical sentence being the sentences corresponding to directed paths in the digraph. We apply computer algebra to analyze various parameters in classes of tree-like sentences. These are graphical sentences constructed on tree-like digraphs. This provides to advanced students in combinatorics a stimulating example of the application of Pólya theory, generating functions and computer algebra methods to analyse various parameters in a discrete situation.

Keywords: Pólya theory, combinatorial structures, digraphs, tree-like sentences

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