

# On Han's Hook Length Formulas for Trees

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**Abstract:** Recently, Han obtained two hook length formulas for binary trees and asked for combinatorial proofs. One of Han's formulas has been generalized to  $k$ -ary trees by Yang. Sagan has found a probabilistic proof of Yang's extension. We give combinatorial proofs of Yang's formula for  $k$ -ary trees and the other formula of Han for binary trees. Our bijections are based on the structure of  $k$ -ary trees associated with staircase labelings.

**AMS Classification:** 05A15, 05A19

**Keywords:** hook length formula,  $k$ -ary tree, bijection, staircase labeling

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