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Walks in the quarter plane

We consider two-dimensional lattice walks, with a fixed set of step directions, restricted to the first quadrant. These walks are well studied, both in a general context of probabilistic models, and specifically as particular case studies for particular cases of direction sets. The goal here is to examine two series associated to these walks: a simple length generating function, and a complete generating function which encodes endpoints of walks, and to determine combinatorial criteria which decide when these series are algebraic, D -finite, or none of the above. We shall present an (almost) complete classification of all nearest neighbour walks where the set of directions is of cardinality three, and discuss how this leads to a natural, well supported, conjecture for the classification of nearest walks with any direction set.

Work in progress with M. Bousquet-Melou.