

# An extension of the Lindström-Gessel-Viennot theorem

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Consider a weighted directed acyclic graph  $G$  having an upward planar drawing. We give a formula for the total weight of the families of non-intersecting paths on  $G$  with any given starting and ending points. While the Lindström-Gessel-Viennot theorem gives the signed enumeration of these weights (according to the connection type), our result provides the straight count, expressing it as a determinant whose entries are signed counts of lattice paths with given starting and ending points. We also show that how our result applies to the tiling theory, in particular, the enumeration of domino tilings of the region with holes.