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Maya R Sankar* (mayars@mit.edu). *Enumerating a Certain Class of Valid Hook Configurations.*

Valid hook configurations are combinatorial objects used to understand West's stack-sorting map. We extend existing bijections corresponding valid hook configurations to intervals in partial orders on Motzkin paths. To enumerate valid hook configurations on 312-avoiding permutations, we build off of an existing bijection into a Motzkin poset and construct a bijection to certain well-studied closed lattice walks in the first quadrant. We use existing results about these lattice paths to show that valid hook configurations on 312-avoiding permutations are not counted by a D -finite generating function, resolving a question of Defant's, and to compute asymptotics for the number of such configurations. We additionally extend a bijection of Defant's to a correspondence between valid hook configurations on 132-avoiding permutations and intervals in the Motzkin-Tamari posets, providing a more elegant proof of Defant's enumeration thereof. To investigate this bijection, we present a number of lemmas about valid hook configurations that are generally applicable, as well as further studying the bijections of Defant's. (Received September 17, 2019)