

## **New Occurrences of the Central Delannoy Numbers in $\mathbb{Z}_2[x]$ and Related Generalized Second Order Lattice Path Set Moments**

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The sequence of central Delannoy numbers  $\{d_n\}_{n=1}^{\infty}$  counts the number of paths in a rectangular lattice from  $(0, 0)$  to  $(n, n)$ , wherein each such path consists of single steps to the east, north, and northeast.

A generalized weighted second moment of a lattice path is the average of the square of the heights of its vertices multiplied by the product of weights assigned to its steps. We shall refer to the sum of such averages for the paths in a given set as a generalized second order lattice path set moment when a function of each vertex height is squared.

In this talk we will discuss new occurrences of  $d_n$  in special classes of polynomials in the ring  $\mathbb{Z}_2[x]$ , and also show that  $d_n$  counts some special generalized second order lattice path set moments for elevated Motzkin paths and elevated Schröder paths associated with such polynomials.

Keywords : Central Delannoy numbers, elevated Motzkin paths, elevated Schröder paths.