

# POLYNOMIAL IDENTITY INVOLVING BINOMIAL THEOREM AND FAULHABER'S FORMULA

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ABSTRACT. In this manuscript we show that for every  $n \geq 1$ ,  $n, m \in \mathbb{N}$  there are coefficients

$\mathbf{A}_{m,0}, \mathbf{A}_{m,1}, \dots, \mathbf{A}_{m,m}$  such that the polynomial identity holds

$$n^{2m+1} = \sum_{k=1}^n \mathbf{A}_{m,0} k^0 (n-k)^0 + \mathbf{A}_{m,1} (n-k)^1 + \dots + \mathbf{A}_{m,m} k^m (n-k)^m$$

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