

# An Identity for Binomial Coefficients

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**Problem.** Prove that for all integers  $j, k, n$ ,  $k \geq 0$ ,  $n \geq 1$ ,

$$\sum_{i=0}^n (-1)^{n-i} \binom{n}{i} \binom{ki}{j} = \begin{cases} 0, & \text{if } 0 \leq j < n; \\ k^n, & \text{if } j = n. \end{cases}$$