Stanley's solution of Anand-Dumir-Gupta conjecture on about magic squares - I

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Abstract: The ADG conjectures concern enumeration of doubly stochastic matrices or magic squares. Let N denote the set of nonnegative integers and let P denote the set of positive integers. An $n \times n$ matrix M is called a magic square if its entries are in $\mathbb{N}$ and the sum of entries in any row or column is a given integer r. The number r is called the line sum of M. Let $H_n(r)$ denote the number of $n \times n$ magic squares with line sum r. Anand, Dumir and Gupta conjectured that this, as a polynomial in r is of degree $(n-1)^2$. Stanley proved this (and much more) using tools from Commutative Algebra. I will give a sketch of his solution. In the first talk, I will discuss the necessary commutative algebra tools required in the proof of Stanley.