Permutations as solutions of linear Diophantine equations and magic squares

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Using elementary arithmetic we have established various general kinds of permutations \((x_1, x_2, \ldots, x_m, y_1, y_2, \ldots, y_m) \in S_{2m} (m, \text{ even number})\) such that \(\sum_{j=1}^{m} (2j - 1) (x_j - y_{m+1-j}) = 0\). Similar results apply to permutations whose orders are successors of multiples of four. We prove that those permutations cannot exist when \(m\) is odd. From those permutations we build magic squares.

Keywords: linear Diophantine equations, permutations, parity, magic squares.