

Signed magic rectangles with two filled cells in each column: Part 1

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A signed magic rectangle $SMR(m, n; r, s)$ is an $m \times n$ array with entries from X , where $X = \{0, \pm 1, \pm 2, \dots, \pm(mr - 1)/2\}$ if mr is odd and $X = \{\pm 1, \pm 2, \dots, \pm mr/2\}$ if mr is even, such that precisely r cells in every row and s cells in every column are filled, every integer from set X appears exactly once in the array and the sum of each row and of each column is zero. In this presentation we show that a signed magic rectangle $SMR(m, n; r, 2)$ exists if and only if $m = 2$ and $n = r \equiv 0, 3 \pmod{4}$ or $m, r \geq 3$ and $mr = 2n$.