Week 25 Problems

AperioMAT

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Level 1

A single piece is placed on the lower left corner square of an $n \times n$-chessboard. The piece may only move horizontally or vertically, one square at a time. How many possible ways are there to move the piece to the opposite corner in $2(n-1)$ moves (the smallest possible number of moves)?

Level 2

Find all functions $f : \mathbb{R} \to \mathbb{R}$ such that the equality

$$f(f(x) + y) = f(x^2 - y) + 4f(x)y$$

holds for all pairs of real numbers (x, y).