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$\forall n \in \mathbb{Z}^+, 1+3+5+\ldots+(2n-1) = n^2$

Proof: Let $P(n)$ be statement "$\forall n \in \mathbb{Z}^+, 1+3+5+\ldots+(2n-1) = n^2$"

Base Case: $P(1)$: $1 = 1^1$ which is true.

Induction Hypothesis: Assume $P(k)$: $1+3+5+\ldots+2k-1 = k^2$

Induction Step: $P(k) \rightarrow P(k+1)$: $1+3+5+\ldots+k+1 = 1+3+5+\ldots+(2k-1)+\ldots(2(k+1)-1)$

$$= k^2 + (2k+1)$$
$$= (k+1)^2 \; \#$$

$\therefore \forall n \in \mathbb{Z}^+, 1+3+5+\ldots+2k-1 = k^2$ is true by mathimatical induction.