1. Prove that the sum of first n odd numbers is equal to n^2.

   Proof: *by Induction*

   Let $P(n)$ be the proposition

$$\sum_{k=1}^{n} k = k^2$$

   (a) Base Case: When $k = 1$,

$$1 = 1^2$$

   which is true

   (b) Inductive Step: Assume that $P(n)$ is true $\forall n \in N$. We have to prove that $P(n) \rightarrow P(n+1)$ is true as well. Therefore, $P(n+1)$ is,

$$\sum_{k=1}^{n+1} k = (k+1)^2$$

   Taking the LHS

$$\sum_{k=1}^{n} k + (n+1)$$

$$n^2 + (n+1) = (n+1)^2$$

   which is the RHS