## Homework #5

- 1. Use induction to prove that for every  $n \in \mathbb{N}$  we have that  $(2n+1)^2 1$  is a multiple of 8.
- 2. Determine the set of natural numbers n for which the following inequality holds:

$$5^n + 6^n < 7^n$$
.

State your claim and prove it using induction.

3. Use induction to prove that for every  $n \in \mathbb{N}$  we have

$$\sum_{k=1}^{n} k^{3} = \left(\sum_{k=1}^{n} k\right)^{2}.$$