Homework-Assignment 1 **Name:** _____

Write-up your solution carefully including all the details of the proof. Due Wednesday September 2.

1. (5 points)

   Let A, B be two sets. Show that $(A \setminus B) \cup (B \setminus A) = (A \cup B) \setminus (A \cap B)$.

2. (5 points) Let a, b be two positive integers. Show that $ab = (a, b)[a, b]$.

3. (5 points)

   Show by using mathematical induction that

   $$1^2 + 3^2 + \cdots + (2n-1)^2 = \frac{n(4n^2-1)}{3}$$

   for all positive integers n.

4. (5 points)

   Let A be a set and $f, g : A \to A$ two functions such that $f \circ g$ is onto. Prove that f is onto.

5. (5 points) (for graduate students only)

   Let A be a set with m elements and B a set with n elements. How many functions $f : A \to B$ are there? Fully explain.