Math 210, Fall 2015
Collected Homework #7

Prove each of the following using mathematical induction.

1. For all $n \in \mathbb{N}$, $1 + 5 + 9 + \cdots + (4n - 3) = 2n^2 - n$.

2. For all $n \in \mathbb{N}$,

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

Note: each of the above propositions can also be written using summation notation, as shown below:

1. For all $n \in \mathbb{N}$,

$$\sum_{i=1}^{n} (4i - 3) = 2n^2 - n$$

2. For all $n \in \mathbb{N}$,

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