## Induction Proof Practice

1. Prove that for any positive integer $n$,

$$1 + 3 + 6 + \ldots + \frac{n(n+1)}{2} = \frac{n(n+1)(n+2)}{6}.$$

2. Prove that for any positive integer $n$,

$$2^n > n.$$

3. Prove by induction that the number of subsets of a set with $n$ elements is $2^n$.

4. Prove that every positive integer $n > 1$, has a prime divisor.

5. Evaluate the sum

$$\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \cdots + \frac{1}{999 \cdot 1000}.$$