Math 260: Linear Algebra
Proofs: Mathematical Induction

Use mathematical induction to prove each of the following statements:

1) $\forall$ integers $n \geq 0$, $n^3 + n$ is even.
2) $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$ for all integers $n \geq 1$.
3) $1 + 3 + 3^2 + 3^3 + 3^4 + \cdots + 3^n = \frac{3^{n+1}-1}{2}$ for all integers $n \geq 1$.
4) $\forall\ n \in \mathbb{N}$, $7^n - 3^n$ is a multiple of 4.