CSC 225 - Summer 2014
Sample Identities for Induction Proofs

Example 1

$$\sum_{i=0}^{n} i = \frac{n(n+1)}{2} \quad \forall n \geq 0$$

Example 2

$$\sum_{i=1}^{n} 2i - 1 = n^2 \quad \forall n \geq 0$$

Example 3

$$\sum_{i=0}^{n} 2^i = 2^{n+1} - 1 \quad \forall n \geq 0$$

Example 4

$$\sum_{i=0}^{n} i^2 = \frac{n(n+1)(2n+1)}{6} \quad \forall n \geq 0$$

(This identity might be helpful for practice, but the proof is too long and tedious to appear on an assignment or test.)

Example 5

$$\sum_{i=1}^{n} 3i^2 - 3i + 1 = n^3 \quad \forall n \geq 0$$

Example 6

Given some constant real number $x \neq 1$,

$$\sum_{i=0}^{n} x^i = \frac{1 - x^{n+1}}{1 - x} \quad \forall n \geq 0$$