

Name: \_\_\_\_\_

**Directions:** Show all work.

1. [5 points] Prove for  $n \geq 0$ , we have  $\sum_{k=0}^n k2^k = (n-1)2^{n+1} + 2$ .

2. [5 points] Prove that for each integer  $n$  with  $n \geq 2$ , we have that  $2^n + 3^n < 4^n$ .