The purpose of this exercise is to test your understanding of geometric and arithmetic sums and induction proofs they equal certain functions.

1. Use mathematical induction to show that
   \[ \sum_{k=0}^{n-1} 2 \cdot 5^k = 2 + 10 + 50 + \cdots + 2 \cdot 5^{n-1} = \frac{5^n - 1}{2} \]

2. Use mathematical induction to show that
   \[ \sum_{k=-3}^{n} 3k + 2 = -7 - 4 - 1 + \cdots + (3n + 2) = \frac{n(3n - 5)}{2} \]