

- 1) [4 points] Prove that $9 \mid (4^{3n} + 8)$ for every integer $n \geq 0$.
- 2) [4 points] Prove that $\sum_{i=1}^n (8i - 5) = 4n^2 - n$ for every positive integer n .
- 3) [4 points] Prove that $1^2 + 2^2 + 3^2 + 4^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$ for every positive integer n .