Proove that $\forall n \in \mathbb{N}, \sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

Proof:
Let $n = 0, P(0)$ is true.
Suppose $\forall n \in \mathbb{N}, \sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$
$\Rightarrow \sum_{k=1}^{n+1} k^2 = \frac{n(n+1)(2n+1)}{6} + (n+1)^2$
$\Rightarrow \sum_{k=1}^{n+1} k^2 = \frac{(n+1)[n(2n+1)+6(n+1)]]}{6}$
$\Rightarrow \sum_{k=1}^{n+1} k^2 = \frac{(n+1)[n(2n+7)+6]}{6}$
$\Rightarrow \sum_{k=1}^{n+1} k^2 = \frac{(n+1)[n(2n+3)+2(2n+3)]}{6}$
$\Rightarrow \sum_{k=1}^{n+1} k^2 = \frac{(n+1)(n+2)(2n+3)}{6}$

Proove that $\forall n \in \mathbb{N}, \sum_{k=1}^{n} k^3 = \frac{[n(n+1)]^2}{4}$

Proof:
Let $n = 0, P(0)$ is true.
Suppose $\forall n \in \mathbb{N}, \sum_{k=1}^{n} k^3 = \frac{[n(n+1)]^2}{4}$
$\Rightarrow \sum_{k=1}^{n+1} k^3 = \frac{n(n+1)^2+4(n+1)^3}{4}$
$\Rightarrow \sum_{k=1}^{n+1} k^3 = \frac{(n+1)^2(n^2+4(n+1))]}{4}$
$\Rightarrow \sum_{k=1}^{n+1} k^3 = \frac{[(n+1)(n+2)]^2}{4}$