1. Prove that for any natural numbers n and d there are unique q and r such that $n = q \cdot d + r$ where $-d \leq r < 0$.

2. Prove for $n \geq 4$ that $n^3 + 20 > n^2 + 15n$.

3. Prove that $\sum_{i=1}^{n} i(i+1) = \frac{n(n+1)(n+2)}{3}$.

4. For $n \in \mathbb{N}$ prove that if $x < y$ then $x^{2n-1} < y^{2n-1}$.