1. Prove that for sets $A$, $B$ and $C$, $A \cap (B \cup C) \subseteq (A \cap B) \cup C$.

2. Prove that if $A$ is a finite set and the function $f : A \to A$ is surjective, then $f$ must be injective.

3. Prove that for real numbers $x$ and $y$, $\lceil x - \lfloor y \rfloor \rceil = \lfloor [x] - y \rfloor$.

4. Prove that $\sum_{k=m+1}^{n} (2k - 1) = n^2 - m^2$.

5. Evaluate $\sum_{k=1}^{n} \frac{k^22^k + k2^k + 1}{k^2 + k}$.