1. Let $A$, $B$, and $C$ be sets. Show that $(A \setminus B) \setminus C = (A \setminus C) \setminus (B \setminus C)$.

2. Can you conclude that $A = B$ if $A$, $B$, and $C$ are sets such that
   
   (a) $A \cup C = B \cup C$?
   
   (b) $A \cap C = B \cap C$?
   
   (c) $A \cup C = B \cup C$ and $A \cap C = B \cap C$?

3. Show that if $A$ and $B$ are finite sets, then $A \cup B$ is a finite set.

4. Prove that for every positive integer $n$, 
   
   $$\sum_{k=1}^{n} k2^k = (n - 1)2^{n+1} + 2$$

5. Prove that $3^n < n!$ if $n$ is an integer greater than 6.