**Motivate all your answers. The use of electronic devices is not allowed.
A formula sheet is included.**

In this exam: $\mathbb{N} = \{0, 1, 2, 3, \ldots\}$.

1. Let $n \in \mathbb{N}$, $n \geq 2$ and let $S = (a_1, a_2, \ldots, a_n)$ be a sequence of n real numbers ($a_i \in \mathbb{R}$ for all $1 \leq i \leq n$). Give quantified expressions for the following statements.

    (a) [2 pt]   All numbers in S are distinct.
    (b) [4 pt]   Exactly one number in S is equal to 6.

2. [6 pt]
    Prove the validity of the following argument using the "Laws of Logic" and the "Rules of Inference".

    $$\neg(p \wedge r)$$
    $$\underline{\neg p \rightarrow (q \wedge r)}$$
    $$\therefore \neg q \rightarrow (p \wedge \neg r)$$

3. [6 pt]
    Let A, B and C be sets in a universe $\mathcal{U}$. Prove that:

    $$A \cup (B - C) = (A \cup B) - (C - A).$$

Total: 18 points