1 Point Set Topology

Let $x = (x_1, x_2, \cdots, x_n)$, $y = (y_1, y_2, \cdots, y_n)$ be 2 n-tuple in $\mathbb{R}^n$, where $n >= 1$.

1. $x = y \leftrightarrow x_j = y_j \ \forall j = 1, \cdots, n$
2. $x + y = (x_1 + y_1, x_2 + y_2, \cdots, x_n + y_n)$
3. $ax = (ax_1, ax_2, \cdots, ax_n)$, $a \in \mathbb{R}$
4. $x - y = x + (-1) \cdot y$
5. $0 = (0, 0, \cdots, 0)$, $0 + x = x + 0 = x$

1.1 Inner Product