1. Cartesian Product with examples

Some relation R over the set U is always produces the set $\mathbf{R}$ which is subset of Cartesian product $U \times U$. Cartesian product is not commutative, ie $A \times B \neq B \times A$. Cartesian product always consists of terms A multiply terms B
Examples of Cartesian products

$$A = \{1, 2, 3\},\ B = \{2, 3, 4\}$$

Let show Cartesian product $A \times B$, fix the A, and add consequently terms of B as follows

$$A \times B = \underbrace{\{1, 2, 3\}}_{fix\ it} \times \{2, 3, 4\} = \{(1, 2), (1, 3), (1, 4), (2, 2), (2, 3), (2, 3), (3, 3), (3, 3), (3, 4)\}$$