

Assignment 1
Exercises: 1

Exercise 1 Turn in a replica of the following two paragraphs (don't worry about the font size, or getting the line breaks to match up- just produce readable text that says the same thing, with the same appearance.

Proof. The Cartesian product (or simply the product) $A \times B$ of two sets A and B is the set consisting of all ordered pairs whose first coordinate belongs to A and whose second coordinate belongs to B . In other words,

$$A \times B = \{(a, b) : a \in A \text{ and } b \in B\}.$$

For example, if $A = \{x, y\}$ and $B = \{1, 2, 3\}$, then

$$A \times B = \{(x, 1), (x, 2), (x, 3), (y, 1), (y, 2), (y, 3)\};$$

while

$$B \times A = \{(1, x), (1, y), (2, x), (2, y), (3, x), (3, y)\}.$$

Since, for example, $(x, 1) \in A \times B$ and $(x, 1) \notin B \times A$, these two sets do not contain the same elements, so $A \times B \neq B \times A$. If $A = \emptyset$ or $B = \emptyset$, then $A \times B = \emptyset$.

For the sets A and B just mentioned, $|A| = 2$ and $|B| = 3$; while $|A \times B| = |B \times A| = 6$. Indeed, for all finite sets A and B ,

$$|A \times B| = |A| \cdot |B|.$$

□