Assignment 1 (Due on the week September 14 – 19)

1. Given the sets $A = \{1, 2, 3, 4, 6\}$, $B = \{2, 4, 6\}$, $C = \{1, 5, 6\}$. Find:

   (a) $(A \cap B) \cup C$,

   (b) $(A \times B) \cap (A \times C)$

2. Given the sets $A = \{a, b, c, d, e\}$, $B = \{f, c, d\}$, $C = \{a, f, c\}$. Find:

   (a) $(A \cup B) \cap C$,

   (b) $(A \cap B) \times (A \cap C)$

3. Find the direct product $A \times B \times C$, using the sets from the previous problem (problem 2).

4. If the domain of the function $y = 5 - 3x$ is the set $\{x \,|\, 1 \leqslant x \leqslant 4\}$, find the range of the function and express it as a set. Do the same for the function $y = x^2 - 6x + 13$.

5. Prove validity of the formula: $(A \cap B) \cup C = (A \cup C) \cap (B \cup C)$,

   (a) By using Venn diagrams (don't forget to show all intermediate calculations, not only the final picture).

   (b) By proving that every element of the set in left-hand side belongs to the set in the right-hand side and vice versa.