

Instructions

The weekly homework is supposed to be worked on paper (I recommend you work by hand on new sheets of paper and scan in the result) and the answer being uploaded. (You do not need to upload the problem sheet.) You may discuss the problems with other class participants, but the final write-up (not just copying an existing response) should be your own.

Each problem carries the same weight and counts towards the homework points.

3) We define 3 sets as:

$$A = \{z \in \mathbb{Z} \mid z > 0 \text{ and } z < 20 \text{ and } z \text{ is even}\}$$

$$B = \{0, 1, 2, 3, \dots, 10\}$$

$$C = \{z \in \mathbb{Z} \mid 5 \leq z \leq 15\}$$

Express, if possible (otherwise write that it is impossible), the following sets in terms of A, B, C , using union, intersection, difference:

$$a) \quad \{6, 8, 10, 12, 14\}$$

$$b) \quad \{5, 7, 9\}$$

$$c) \quad \{0, 2, 4, 6, 8, 10\}$$

$$d) \quad \{2, 4\}$$

$$e) \quad \{0, 1, 3, 5, 7, 9\}$$

$$f) \quad \{2, 4, 12, 14\}$$

4) a) Give an example of sets A, B, C such that $(A \cap B) \cup C = A \cap (B \cup C)$.

b) Give an example of sets A, B, C such that $(A \cap B) \cup C \neq A \cap (B \cup C)$.

5) Write the following expression in *disjunctive normal form*, that is as a union of (intersections of (sets or complements)):

$$((A \cap B^c) \cup C)^c \cap (D \cup E)^c.$$

6) Draw the Hasse Diagrams for the power sets of \emptyset , $\{1\}$, and $\{5, 6, 7, 8\}$.

7) Let A, B be nonempty sets with $a \in A$, $a \notin B$. Show that $A \times B \neq B \times A$.

Hint: Find an element in $A \times B$ that is not in $B \times A$.