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.

8) Let $A = \{4, 5, 6, 7\}$ and $B = \{11, 12, \ldots, 17\}$. Define a relation R for $a \in A$ and $b \in B$ by

$$aRb \Leftrightarrow a \text{ and } b \text{ have a common divisor larger than } 1.$$

Write down the elements of R.

9) Sketch the graphs (not all in the same coordinate system, please) for the following relations on $S = \{x \in \mathbb{R} \mid -10 \le x \le 10\}$:
a) $R_1 = \{(a, b) \in S \times S \mid a^2 + b^2 = 25\}$
b) $R_2 = \{(a, b) \in S \times S \mid a - b > 5\}$
c) $R_3 = \{(a, b) \in S \times S \mid |a^2 - b| \le 4\}$
d) $R_4 = \{(a, b) \in S \times S \mid a \text{ is an integer}\}$

10) Show that $(A \cup B) \setminus (A \cap B) = (A \setminus B) \cup (B \setminus A)$.
Hint: $A \setminus B = A \cap B^{\complement}$. Then use the laws for set operations we have seen.