MATH 250 HANDOUT 8 - OPERATIONS ON SETS

(1) Prove or disprove each of the following:
   (a) $12\mathbb{Z} \cap 18\mathbb{Z} = 36\mathbb{Z}$.
   (b) $12\mathbb{Z} \cup 18\mathbb{Z} \subset 4\mathbb{Z}$.
   (c) $12\mathbb{Z} \cup 18\mathbb{Z} \supset 4\mathbb{Z}$.

(2) Prove each of the following:
   (a) $(-10, 5] \cap [0, 10] = [0, 5]$.
   (b) $(-10, 5] \cup [0, 10] = (-10, 10]$.
   (c) $(-10, 5] - [0, 10] = (-10, 0)$.

(3) Prove that $4\mathbb{Z} - 6\mathbb{Z} = 4\mathbb{Z} - 3\mathbb{Z}$.
(4) What is $12\mathbb{Z} - 4\mathbb{Z}$?

(5) Let $A, B \subset C$ be sets. Prove each of the following:
   (a) $A \cap B \subset A$;
   (b) $A \cap \emptyset = \emptyset$;
   (c) Suppose that $B \subset C$. Prove that $A - C \subset A - B$.
   (d) $A \subset B$ if and only if $A \cap B = A$.