MATH 250 HANDOUT 6 - SETS

(1) Recall that $d\mathbf{Z} = \{n : n \in \mathbf{Z} \text{ s.t. } d \mid n\}$.
   (a) $25\mathbf{Z} \subset 5\mathbf{Z}$;
   (b) $5\mathbf{Z} \subset 25\mathbf{Z}$;
   (c) $24\mathbf{Z} \subset 4\mathbf{Z}$;

(2) Prove or disprove each of the following:
   (a) $(-1, 1) \subset (-2, 2)$.
   (b) $(-1, 2) \subset (-2, 1)$.

(3) Let A, B, C and D be arbitrary sets. Prove or disprove the following.
   (a) If $A \subset B$, $B \subset C$, and $C \subset D$, then $A \subset D$.
   (b) If $A \not\subset B$ and $B \not\subset C$, then $A \not\subset C$.
   (c) If $A \subset B$ and $B \not\subset C$, then $A \not\subset C$.

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

(5) Prove that $4\mathbf{Z} - 6\mathbf{Z} = 4\mathbf{Z} - 3\mathbf{Z}$.

(6) 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 $A \cap B = A$.