# MATH 220 HANDOUT 6 - SETS

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

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

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

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