

## MATH 250 HANDOUT 6 - SETS

- (1) Recall that  $d\mathbf{Z} = \{n : n \in \mathbf{Z} \text{ s.t. } d \mid n\}$ .
  - (a)  $25\mathbf{Z} \subseteq 5\mathbf{Z}$ ;
  - (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  $A \cap B = A$ .