

**MATH250: FOUNDATIONS OF MATHEMATICS
SPRING 2020**

Practice Problems Chapter 2:

Note: This set only involves materials in Section 2.1 and 2.2. Please let me know if you find any typo.

- (1) Section 2.2: 4, 5, 14, 15, 22, 24.
- (2) Recall that $d\mathbb{Z} = \{n \in \mathbb{Z} \mid d \mid n\}$. Prove or disprove the following:
 - (a) $25\mathbb{Z} \subset 5\mathbb{Z}$
 - (b) $24\mathbb{Z} \subset 4\mathbb{Z}$
 - (c) $5\mathbb{Z} \subset 25\mathbb{Z}$
- (3) Prove that $(-1, 1) \subset (-2, 2)$.
- (4) Prove the following.
 - (a) $(-10, 5] \cap [0, 10] = [0, 5]$
 - (b) $(-10, 5] \cup [0, 10] = (-10, 5]$
 - (c) $(-10, 5] - [0, 10] = (-10, 0)$.
- (5) Let A, B, C be sets. Draw a Venn diagram demonstrating each of the following and then prove each of the following.
 - (a) $A - (B \cap C) = (A - B) \cup (A - C)$
 - (b) $(A - B) \cup (B - A) \subset (A \cup B) - (A \cap B)$
 - (c) If $A - B \subset C$, then $\overline{C} \subset \overline{A} \cup B$
 - (d) If $A \subset B$, then $A \cup B - A \cap B = B - A$.
- (6) Disprove the following.
 - (a) For all sets A, B, C , $A \cup (B \cap C) = (A \cup B) \cap C$.
 - (b) For all sets A, B, C , if A, B are subsets of C , then $(C - A) - B = C - (A - B)$.