

Problems:

1. Which of the following statements is true?
 - (a) $\{x\} \subseteq \{x\}$
 - (b) $\{x\} \in \{x, \{x\}\}$
 - (c) $\{x\} \in \{x\}$
 - (d) $\{x, \{x\}\} \subseteq \mathcal{P}(\{x\})$
 - (e) $\emptyset \in \emptyset$
 - (f) $\emptyset \in \mathcal{P}(\emptyset)$
 - (g) $\emptyset \subseteq \{x\}$
 - (h) $\{\emptyset\} \subseteq \emptyset$

2. Can you conclude that $A = B$ if A, B, C are sets such that
 - (a) $A \cup C = B \cup C$
 - (b) $A \cap C = B \cap C$
 - (c) $A \cup B = B \cup C$ and $A \cap C = B \cap C$

Justify your answers.

3. Section 5.1, exercise 44 [5th edition: Section 4.1, exercise 42]
4. Section 5.1, exercise 58 [5th edition: Section 4.1, exercise 54]
5. In a dinner party with n people, all of them are seated at a circular table. Suppose there is a name tag at each place of the table, and suppose that nobody sits down in their correct place. Show that it is possible to rotate the table so that at least two people are sitting in the correct place.
6. Section 5.2, exercise 10 [5th edition: Section 4.2, exercise 10]
7. Section 5.3, exercise 22 [5th edition: Section 4.3, exercise 22]
8. Section 5.3, exercise 28 [5th edition: Section 4.3, exercise 28]
9. Section 5.3, exercise 30 [5th edition: Section 4.3, exercise 30]