HOMEWORK 19
MATH 3345 – AUTUMN 2022 – KUTLER

Please complete the following problems on your own paper. Solutions should be written clearly, legibly, and with appropriate style.

1. [**Falkner Section 10 Exercise 6**]

   (a) Find a set A and a set B such that $A \notin B$ and $A \nsubseteq B$.

   (b) Find a set A and a set B such that $A \in B$ and $A \subseteq B$.

2. [**Falkner Section 10 Exercise 7**] Let $A = \{1, \{4, 7\}, 9\}$ and $B = \{\{1, 4\}, 7, 9\}$. Find $A \cup B$, $A \cap B$, $A \setminus B$, and $B \setminus A$.

3. [**Falkner Section 10 Exercise 8**] Let A and B be sets. Show that $A \cap B \subseteq A$ and $A \cap B \subseteq B$.

4. [**Falkner Section 10 Exercise 9**] Let A, B, and C be sets. Suppose $C \subseteq A$ and $C \subseteq B$. Show that $C \subseteq A \cap B$.

5. [**Falkner Section 10 Exercise 10**] Let A and B be sets. Show that $A \subseteq B$ if and only if $A \cap B = A$.

Practice Problems

It is strongly recommended that you complete the following problems. There is no need to write up polished, final versions of your solutions (although you may find this a useful exercise). Please do not submit any work for these problems.

1. Let A and B be sets. Prove that
$$A \cup B = B \cup A \qquad \text{and} \qquad A \cap B = B \cap A.$$

2. Let A, B, and C be sets. Prove that
$$(A \cup B) \cup C = A \cup (B \cup C) \qquad \text{and} \qquad (A \cap B) \cap C = A \cap (B \cap C).$$

3. Give an example of sets A, B, and C such that
$$(A \cup B) \cap C \neq A \cup (B \cap C).$$