

HOMEWORK 19
MATH 3345 – SPRING 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 9]** Let A , B , and C be sets. Suppose $C \subseteq A$ and $C \subseteq B$. Show that $C \subseteq A \cap B$.
2. **[Falkner Section 10 Exercise 10]** Let A and B be sets. Show that $A \subseteq B$ if and only if $A \cap B = A$.
3. **[Falkner Section 10 Exercise 15 – modified]** Let S , A , and B be sets.
 - (a) Prove that $S \setminus (A \setminus B) = (S \setminus A) \cup (S \cap B)$.
 - (b) Deduce that $A \setminus (A \setminus B) = A \cap B$.
 - (c) Deduce that $B \setminus (A \setminus B) = B$.

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. **[Falkner Section 10 Exercise 11]** Let A and B be sets. Show that $A \subseteq B$ if and only if $A \setminus B = \emptyset$.
2. **[Falkner Section 10 Exercise 12]** Prove Proposition 10.18(b): Let A and B be sets and let x be any object. Then

$$x \notin A \cap B \text{ if and only if } x \notin A \text{ or } x \notin B.$$