

Math 295 - Spring 2020
Homework 3

This homework is due on Wednesday, January 29. All problems are adapted from Munkres's *Topology*.

1. Determine which of the following statements are true for all sets A, B , and C . If an equality fails, determine whether the statement becomes true if the “equal” symbol is replaced by one or the other of the inclusion symbols \subset or \supset .
 - (a) $A - (A - B) = A - B$
 - (b) $A \cap (B - C) = (A \cap B) - (A \cap C)$
 - (c) $A \cup (B - C) = (A \cup B) - (A \cup C)$
2. Let X be a topological space and A be a subset of X . Suppose that for each $x \in A$ there is an open set U containing x such that $U \subset A$. Show that A is open in X .
3. Show that the collection \mathcal{T}_c given in Example 4 of Section 12 is a topology on the set X .
4. Let X be any set. Is the collection

$$\mathcal{T}_\infty = \{U \mid X - U \text{ is infinite or empty or all of } X\}$$

a topology on X ?