

Let A, B, C be sets. Show that the following statements hold:

1. $A \cup A = A$
2. $A \cap A = A$
3. $A \setminus A = \emptyset$
4. $A \cap \emptyset = \emptyset$
5. $A \cup \emptyset = A$
6. $A \cap (B \cap C) = (A \cap B) \cap C$
7. $A \cup (B \cup C) = (A \cup B) \cup C$
8. $A \cap B = B \cap A$
9. $A \cup B = B \cup A$
10. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
11. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
12. $(A \cap B)' = A' \cup B'$
13. $(A \cup B)' = A' \cap B'$
14. $A \subseteq B$ iff $A \cap B = A$
15. $(A \setminus B) \cap (B \setminus A) = \emptyset$
16. $A \cup B = (A \cap B) \cup (A \setminus B) \cup (B \setminus A)$
17. $(A \cup B) \times C = (A \times C) \cup (B \times C)$
18. $(A \cap B) \setminus B = \emptyset$
19. $(A \cup B) \setminus B = A \setminus B$
20. $A \setminus (B \cup C) = (A \setminus B) \cap (A \setminus C)$
21. $A \cap (B \setminus C) = (A \cap B) \setminus (A \cap C)$
22. $(A \setminus B) \cup (B \setminus A) = (A \cup B) \setminus (A \cap B)$