

Homework 1: Due Tuesday, August 30

Reading: Chapter 1, Appendix A, Appendix C

Problem 1: Given two set A and B , prove that $A \cap B = B \cap A$.

Problem 2: Given sets A, B, C , prove that $A \cap (B \setminus C) = (A \cap B) \setminus C$.

Problem 3: Let S be a fixed set and A, B denote two subsets of S . Show that $(A \cup B)^c = A^c \cap B^c$.

Problem 4: Show that $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$.

Problem 5: Suppose we are given two statements p and q . Show that

$$(\sim (p \Rightarrow q)) \Leftrightarrow (p \wedge \sim q).$$

Problem 6: Prove the following statement:

If x and y are odd integers, then $x + y$ is an even integer.

Problem 7: Show that for every integer x , $x + 4$ is odd if and only if $x + 7$ is even.

Problem 8: Show that if x is a real number such that $\frac{x^2-1}{x+2} > 0$, then either $x > 1$ or $-2 < x < -1$.

Hint: Factor the numerator of the given fraction. Then note that you have 4 cases to consider depending on the ‘signs’ (i.e. whether it is positive or negative) of each of the linear factors appearing in the numerator and denominator.