

Math 215: Introduction to Advanced Mathematics
Problem Set 5

Due Friday October 11

Do the following problem from the text: pg 115: 3

- 1) Prove that $A - (B \cap C) = (A - B) \cup (A - C)$.
- 2) Prove that $A \cap (B \cup C) = (A \cap B) \cup C$ if and only if $C \subseteq A$.
- 3) Let A and B be subsets of a universal set U .
 - a) Prove that $B \subseteq A^c$ if and only if $A \cap B = \emptyset$.
 - b) Using a) and taking complements, prove that $A^c \subseteq B$ if and only if $A \cup B = U$.
 - c) Deduce from a) and b) that $B = A^c$ if and only if $A \cap B = \emptyset$ and $A \cup B = U$.
- 4) a) Prove that $(A \times B) \cup (C \times D) \subseteq (A \cup C) \times (B \cup D)$.
b) Give examples showing these sets need not be equal.