Math 206 — Operations on Sets

Problem 1. Let A, B, and C denote subsets of some universal set. The following is a list of partial statements for general properties involving sets and set operations. Fill in the blanks to complete the statement.

a. $\emptyset$___A and A___A. Fill in the blanks with $\subseteq, \in, \not\subseteq$, or $\subsetneq$

b. $(A^c)^c = $___

c. $A \cup \emptyset = $___

d. $A \cap \emptyset = $___

e. $A \cap A = $___

f. $A \cup A = $___

g. Associative property: $(A \cup B) \cup C = $___

h. Associative property: $(A \cap B) \cap C = $___

i. Distributive property: $(A \cup B) \cap C = $___

j. Distributive property: $(A \cap B) \cup C = $___

k. DeMorgan's Law: $(A \cup B)^c = $___

l. DeMorgan's Law: $(A \cap B)^c = $___

m. Fill in the blanks with $\subseteq, =$, or $\supseteq$:

    1. $A \subseteq C$ and $B \subseteq C$ if and only if $A \cup B$___C

    2. $C \subseteq A$ and $C \subseteq B$ if and only if $A \cup B$___C

    3. $B \subseteq A$ if and only if $A \cup B$___A

    4. $B \subseteq A$ if and only if $A \cap B$___B

Problem 2. Let A, B, C be sets. Suppose $C^c \subseteq B$. Prove that $(A \setminus B) \cup C = C$.