Homework #12

________________________________ ____
Name Sec

Questions:	Answers:
1. Given the universal set U = {a, b, c, d, e, f, 1, 2, 3, 4, 5, 6, 7, 8, 9} let A = {a, b}, B = {a, c, 2, 4, 6}, C = {1, 2, 3, 4} and D = $\varnothing$. Evaluate each expression: a) $\|D\|$ b) $D \in A$ c) $\overline{B}$ d) $A \cap B$ e) $(U - B) \cup C$ f) $C \subseteq B$	
2. Prove: $A \cap A = A$ Use the definition of $\cap$. Justify each step in your proof. (Hint: convert left side to right side.)	

3. Prove: $(A - B) \cap C \subseteq A \cap C$ Use the definitions of set difference, intersection, and subset. Justify each step in your proof. (Hint: turn the problem into an implication and do a deductive proof.)	
4. Show that we cannot prove: if $A \cup B = A \cup C$, then $B = C$. To show that something cannot be proved, you should always give any one counter example —preferably the simplest one you can find. This shows that the statement cannot be a tautology because there is at least one case for which the statement to be proved is false. A counter example must satisfy all the premises and violate the conclusion (i.e. for the implication to be proved, $P \Rightarrow Q$, P must be true and Q must be false).	
5. Using set laws, reduce: $(A \cap B) \cup (A \cap \sim B)$ to A Justify each transformation with one or more laws	

6. Using set laws, reduce: $((A \cup B) \cap (U \cup \sim B)) \cup$ $(\sim B \cup (B \cap \sim C) \cup C)$ to U (the universe of all elements). Justify each transformation with one or more laws.	
7. Given the universal set: U = {a, b, c, d, e, f, 1, 2, 3, 4, 5, 6, 7, 8, 9} let A = {a,b}, B={a,c,2,4,6}, C= {1,2,3,4} and D=∅. Evaluate each expression: a) $A \times B$ b) the relation on $A \times C$ in which the second element of the ordered pairs is larger than 3.	

c) $\lvert A \times B \times C \rvert$ d) $C \times D \subseteq A \times B$	