NAME:_____

1. Give truth tables for the following logical expressions. Make sure I can find your answer without any confusion.

p	q	r	$(p \rightarrow q) \vee (p \rightarrow r)$	$(p \vee r) \rightarrow (r \wedge q)$	$(p \wedge \sim r) \vee (\sim p \wedge q)$
T	**T**	**T**			
T	**T**	**F**			
T	**F**	**T**			
T	**F**	**F**			
F	**T**	**T**			
F	**T**	**F**			
F	**F**	**T**			
F	**F**	**F**			

2. Which of the following are propositions? Write Yes or No in the blank provided.

   a._____If Mississipi wore her New Jersey, what would Delaware?

   b._____I can jump higher than the building.

   c._____George Bush likes Broccoli.

   d._____Open your book to page 10.

   e._____Answer "maybe" to this question.

   f._____I am going to get an A in Discrete Structures.

   g._____A big fat funny-looking rabbit.

   h._____I wish I had false teeth.

   i._____If elephants can fly then cows have wings.

   j._____What is your favorite course?

3. The following is one of DeMorgan's laws (for propositions). State *the other one* and prove it using truth tables.

   $\sim (p \wedge q) = \sim p \vee \sim q$

4. Let U={1,2,3,4,5,6,7,8,9,10,11,12}, A={1,3,5,7,9,11}, B={2,3,5,6,8,9}, C={2,4,6,8,10,12}, D={4,8,12}. List the contents of the following sets. Use f for the empty set.

   a. $A \cup B$

   b. $A \cap B$

   c. $C \cap D$

   d. $C - D$

   e. $D - C$

   f. $A \cap C$

   g. $A' \cup \mathrm{f}$

   h. $D \cap B'$

   i. $A \cap B \cap C$

   j. $A \cup B \cup C \cup D$

5. State the commutative, associative, and distributive laws for Boolean algebra.

6. Which of the following statements are true?

_____ a. If I was rich then I would buy an airplane.

_____ b. If 2+2=4 then 3+3=5.

_____ c. If car tires were made of concrete then roads would be made out of rubber.

_____ d. If a new motorcycle costs more than $100 then I am the pope.

_____ e. If 1+1=2 then 27+3 = 30.

7. Prove or disprove using truth tables: $(p \to q) \to r \equiv r \vee (p \to q)$.

8. Prove the following. $((A \cap B) \cap C) \subseteq (B \cup C)$