

NAME: \_\_\_\_\_

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

p	q	r	$(p \wedge q) \rightarrow (p \vee r)$	$(p \vee q) \wedge (q \vee \sim r)$	$(p \wedge r) \vee \sim q$
<b>T</b>	<b>T</b>	<b>T</b>			
<b>T</b>	<b>T</b>	<b>F</b>			
<b>T</b>	<b>F</b>	<b>T</b>			
<b>T</b>	<b>F</b>	<b>F</b>			
<b>F</b>	<b>T</b>	<b>T</b>			
<b>F</b>	<b>T</b>	<b>F</b>			
<b>F</b>	<b>F</b>	<b>T</b>			
<b>F</b>	<b>F</b>	<b>F</b>			

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

- a. \_\_\_\_\_ When in the course of human events.
- b. \_\_\_\_\_ Is this test hard?
- c. \_\_\_\_\_ Gorillas have big feet.
- d. \_\_\_\_\_ Elephants can fly.
- e. \_\_\_\_\_ Answer “yes” to this question!
- f. \_\_\_\_\_ My Discrete Structures professor is stronger than Superman.
- g. \_\_\_\_\_ Why *shouldn't* space aliens exist?
- h. \_\_\_\_\_ One plus one plus one plus one.
- i. \_\_\_\_\_ Two plus two is equal to the square root of seven.
- j. \_\_\_\_\_ Computer Science is cool.

3. Prove the following identity using truth tables. (Remember that a truth table by itself is not a proof.)

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

4. Let  $U = \{a, b, c, d, e, f, g, h, x, y\}$ ,  $A = \{a, b, c, d, e, f\}$ ,  $B = \{c, d, e, x\}$ ,  $C = \{a, g, h, y\}$ ,  $D = \{f, x\}$ . List the contents of the following sets. Use  $\emptyset$  for the empty set.

a.  $A \cup B$

b.  $A \cap B$

c.  $B \cap C$

d.  $B \cap (C \cup D)$

e.  $A'$

f.  $A - B$

g.  $B - A$

h.  $(B \cup D) \cap C$

i.  $(A - B) \cup D$

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



6. Give the commutative, associative, and distributive laws for integers. Make sure to state them correctly.

7. Prove the following.

$$(x + 7)(x + 4) = x^2 + 11x + 28$$