

NAME: _____

1. Convert the following decimal numbers into 8-bit binary numbers in two's-complement notation.

30, 76, -50, 103, -60

2. Convert the following 8-bit binary numbers, which are in two's complement form, into decimal.

01001001, 10010010, 00110101, 11110000, 00001111

3. Convert the following numbers from hexadecimal into binary. These are unsigned numbers of arbitrary size.

ABC, 013, 296, D8F57E, 19

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

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

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

- a. _____ Resistance is futile!
- b. _____ An onion a day keeps your girl/boy friend away.
- c. _____ Believe me!
- d. _____ I know the answer.
- e. _____ How do you know?
- f. _____ A little bird told me.
- g. _____ And the pale and the leader and eyes look so blue.
- h. _____ Now is the winter of our discontent.
- i. _____ If wishes were horses then beggars could ride.
- j. _____ Discrete structures is the best course ever!

6. Prove the following set identity.

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

7. Let $U = \{a, b, c, d, e, f, g, h, i\}$, $A = \{a, b, c, d\}$, $B = \{e, f, g\}$, $C = \{g, h, i\}$, $D = \{h, i\}$. 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. $D - C$

e. $C - D$

f. A'

g. $B \cap \emptyset$

h. $A \cap B'$

i. $C \cup D$

j. $(A \cup B \cup C \cup D) \cup \emptyset$

8. Which of the following statements are true?

_____ a. If wishes were horses then beggars could ride.

_____ b. If the sun were a turnip then we'd all be fried.

_____ c. If George Washington was the first president then Abraham Lincoln was the second.

_____ d. If I get a new motorcycle for my birthday they I will be really happy.
(think true.)

_____ e. If the sun is really a star then the moon must be a grapefruit.