ASSIGNMENT: 4

Q1. Simplify the following formulas:

    a. $p \wedge (p \wedge q)$

    b. $\overline{\overline{p} \vee q}$

    c. $\overline{p \Rightarrow \overline{q}}$

Q2. What does logically equivalent statements means? What are the different properties of it?

Q3. Reduce to CNF the following formulas:

    a. $\neg((((a \rightarrow b)) \rightarrow a) \rightarrow a)$

    b. $\neg(a \vee (a \rightarrow b))$

Q4. Socrate says:

    "If I'm guilty, I must be punished;

    I'm guilty. Thus I must be punished."

  Is the argument logically correct? Why or why not give explanation.

Q5. Given the premises "$p \rightarrow q$" and "$r \rightarrow s$", does it entail "$(p \wedge r) \rightarrow (q \wedge s)$"?

Q6. Consider the following statements:

    p: The number is even.

    q: The number is odd.

    r: The number is prime.

Determine if the following set of statements is consistent or inconsistent: $\{p \wedge q, \neg r\}$.

Q7. Consider the following logical formula:

    $(p \rightarrow q) \wedge (\neg p \rightarrow r) \wedge (\neg q \vee \neg r)$

Is this formula satisfiable? If yes, provide an assignment of truth values to the variables that satisfies the formula. If no, explain why.