Homework 1
CS 311: Discrete Math for CS (Bulko)
Due 02/03/17 @ 11:59 pm

Problem 1

(8 points each). Draw the truth table for the following compound propositions:

\[(p \lor q) \oplus \neg q\]
\[(p \land q) \rightarrow q\]
\[(p \leftrightarrow q) \lor (\neg p \leftrightarrow q)\]

Problem 2

(4 points). Write the following English sentence as a proposition:

"I can take cryptography if I have taken discrete math and have not taken number theory."

Problem 3

(8 points each). Evaluate the following bit string expressions.

\[1110 \land (1011 \lor 0011)\]
\[11101 \oplus (10011 \oplus 00111)\]
\[(10110 \lor 11101) \land 10001\]
Problem 4

(8 points each). Determine if the following propositions are logically equivalent.

\[ p \rightarrow q \text{ and } \neg p \rightarrow \neg q \]

\[ \neg(p \oplus q) \text{ and } p \rightarrow q \]

\[ (p \rightarrow r) \lor (q \rightarrow r) \text{ and } (p \land q) \rightarrow r \]

Problem 5

(8 points each). Determine if each proposition is satisfiable.

\[ (p \lor \neg q) \land (\neg p \lor q) \land (\neg p \lor \neg q) \]

\[ (p \iff q) \land (\neg p \iff q) \]

\[ (p \land q) \rightarrow p \]