

CS 2800: Discrete Structures

Homework 12

Due Friday, November 30, 2012

Please write your netid in sufficiently large font on the upper right corner of all pages. Grading for all problems will be based on neatness, style, and correctness.

1. A manufacturing plant produces a product where one in a hundred is defective. They install a test that when applied to a defective product will indicate that the product is defective 98 out of 100 times. However, when the test is applied to a non defective product once out of a hundred times it mistakenly indicates that the product is defective. What is the probability that a product is defective if the test says it is defective?
2. What are the Boolean functions
 - (a) $(x \rightarrow y) \rightarrow y$?
 - (b) $(x \rightarrow y) \rightarrow x$?

Express your answers using AND, OR, and NEGATION.

3. There are two types of people in a certain group. Liars who always lie and truth tellers who always say the truth. In each of the following can you say anything about the type of person.
 - (a) A says at least one of us is a liar. B says nothing.
 - (b) A says both of us are truth tellers and B says A is a liar.
 - (c) A and B both say we are truth tellers.
4. In first order logic how would you state that $G = (S, +)$ is a group? Quantifiers would range over elements of S .
5. How would you verify that a logical inference is valid in propositional logic?