MATH 2112 / CSCI 2112
Assignment # 1
Due Wednesday, September 20, 2006

From the text:

Section 1.1: 5, 15, 17, 20, 22, 26, 30, 33, 34, 51
Note: For 20, 22, and 26, provide a truth table if they are equivalent, and provide a counterexample
if they are not. For 30, 33, and 34, you may write your answers in symbolic notation or in English.

Section 1.2: 15, 21.

Section 1.4: 2, 4, 10, 12, 17, 19.

Section 1.5: 2, 3, 5, 8, 9, 11, 16, 20, 24, 26

Also do the following problems. For problems 1–8, translate into symbolic notation.

1. If I have lost if I cannot make a move, then I have lost.

2. It is not the case that Cain is guilty and Abel is not.

3. McX has been elected, or Wyman has been elected and a new era has begun.

4. McX has been elected or Wyman has been elected, and a new era has begun.

5. In order for the party to function better, it is necessary that more contact be made with the electorate.

6. In order for the party to function better, it is sufficient that Smith be ousted.

7. Bob is in a bad mood only if he has just gotten up.

8. If father and mother both go, then I won't, but if only father goes, then I will go too.

Write the converse and the contrapositive (in natural language) of the following theorems.

9. If x is a prime number greater than 2, then x must be odd.

10. If x is an even perfect number, then x can be written in the form $2^{n-1}(2^n - 1)$ where $2^n - 1$ is prime.

And finally...

11. Construct circuits equivalent to the NOT, AND, and OR gates using only NOR gates.