Embedded Real-Time Systems (AME 3623)
Homework 1

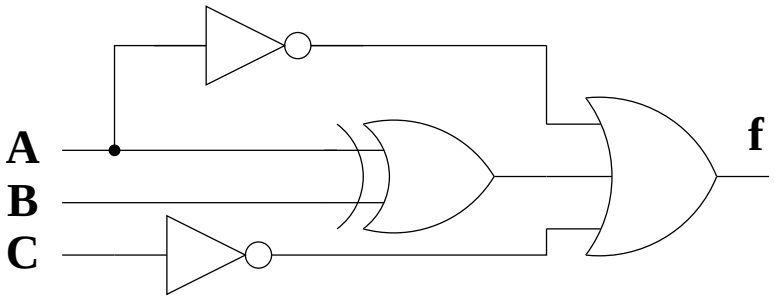
January 25, 2008

This homework assignment is due on Tuesday, February 5th at 5:00pm. Your work may be handed in electronically (use the **Homework 1** digital dropbox on D2L) or in hardcopy form (in person or in office).

This assignment must be done individually: do not share/discuss your answers with others or look at the answers of others. Also: although you may use general logic references from the net, you may not obtain solutions to these problems from the net.

Question 1

Consider the following circuit.



1. (10 pts) What is the corresponding truth table?

A	B	C	f
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

2. (10 pts) Show the simplified circuit (this should require very little reduction).

Question 2

Consider the following function:

A	B	C	f
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

1. (10pts) Show the algebraic expression for the "minterm" form of the circuit (set of 3-term ANDs that are then ORed together).

2. (10pts) Show the corresponding circuit

3. (10pts) Reduce this algebraic expression to a minimal form (note that there may be more than one correct answer). **Show each step, showing the name of the algebraic rule that you use.**

4. (10pts) Show the corresponding circuit

Question 3

Consider the following function:

A	B	C	f
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

1. (10pts) Show the algebraic expression for the "minterm" form of the circuit.

2. (10pts) Reduce this algebraic expression to a minimal form. Show each step, showing the name of the algebraic rule that you use.

3. (10pts) Show the reduced circuit.

Question 4

1. (10 pts) Suppose you need a circuit to perform an AND between two inputs, but that you only have 2-input NAND gates. What would the circuit look like? Show the algebraic rules that you use.

2. (10 pts) Suppose you need a circuit to perform an OR between two inputs, but that you only have 2-input NAND gates. What would the circuit look like? Show the algebraic rules that you use.

Question 5

How much time did you spend on this homework assignment?