Embedded Real-Time Systems (AME 3623)
Homework 2

January 31, 2006

This homework assignment is due on Tuesday, February 7th at 5:00pm. Your work may be handed in electronically (use the **Homework 2** digital dropbox on D2L) or in hardcopy form (in person or see the administrative assistant on the first floor of Engineering Lab; next to the West entrance).

This assignment must be done individually: do not share/discuss your answers with others or look at the answers of others.

Question 1

Consider the following function:

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

1. (10pts) Show the corresponding Karnaugh map and a good set of covering clusters.
2. (10pts) What is the algebraic description of the reduced circuit?
3. (10pts) Show the reduced circuit.

Question 2

Consider the following function:

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

1. (10pts) Show the corresponding Karnaugh map and a good set of covering clusters.

2. (10pts) What is the algebraic description of the corresponding circuit?

3. (10pts) What is the algebraic description of the simplest circuit (in terms of the number of logic gates)?

Question 3

Consider the following function:

A	B	C	D	f
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	x
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	x
1	1	1	0	x
1	1	1	1	1

Where "x" is a don't care case.

1. (10pts) Show the corresponding Karnaugh map and a good set of covering clusters.
2. (10pts) What is the corresponding algebraic description of the reduced circuit?
3. (10pts) Show the reduced circuit.

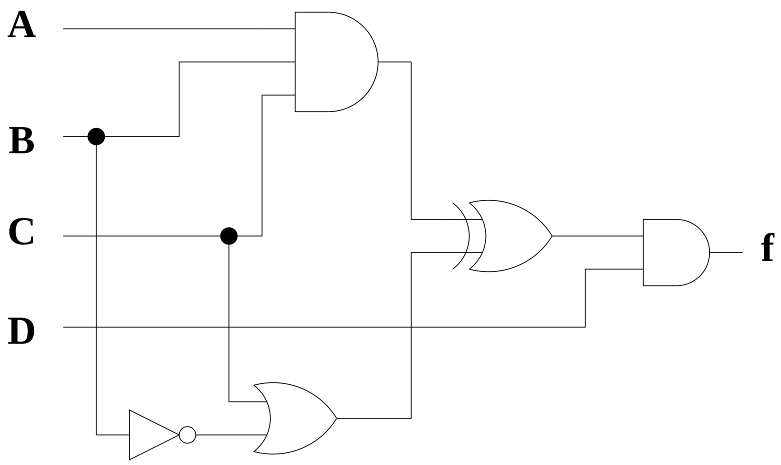
Question 4

In class we designed a 2-input multiplexer (with one *select* input).

(10 pts) Using this component as a building block, show the design for a 4-input multiplexer. By *building block*, we mean that you should use the multiplexer symbol in your design (as opposed to the AND, OR, and NOT gates that make up the multiplexer).

Question 5

Consider the following circuit (note its relationship to the one in homework 1).



1. (10 pts) What is the corresponding truth table?
2. (10 pts) Show the Karnaugh map, the clusters, and the reduced algebraic representation.
3. (10 pts) Show the simplified circuit.

Question 6

How much time did you spend on this homework assignment?