Embedded Real-Time Systems (AME 3623)
Homework 2

February 14, 2007

This homework assignment is due on Thursday, February 15th 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 in office).

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

Question 1

1. (5pts) Given the binary number: 1101000. What is the decimal equivalent? Show your work.

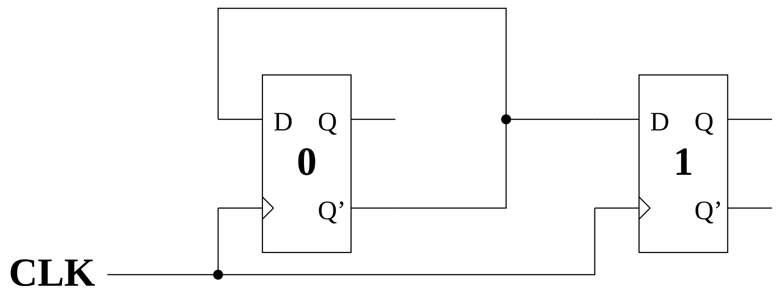
2. (5pts) Given the binary number: 101110. What is the decimal equivalent? Show your work.

3. (5pts) Given the decimal number: 57. What is the binary equivalent? Show your work (all of the steps of the algorithm that we discussed in class).

4. (5pts) Given the decimal number: 119. What is the binary equivalent? Show your work.

Question 2

Consider the following circuit:



1. (10pts) Show the truth table that enumerates all possible states (the Qs) and shows the next state.

Q_1	Q_0	D_1	D_0
0	0		
0	1		
1	0		
1	1		

2. (10pts) Assuming that the initial state is $Q_1 = 0$ and $Q_0 = 1$, what is the sequence of states that the circuit moves through over the next four clock "ticks" (four high-to-low transitions)?

Question 3

Imagine a circuit with two flip flops (we will call their states Q_1 and Q_0). The circuit also has a control signal (C): when $C = 1$, the circuit will increment its state on the high-to-low clock transition (so the circuit is a counter); when $C = 0$, the circuit will not change state on the high-to-low clock transition.

1. (10pts) Give the truth table that expresses the behavior of this circuit.

C	Q_1	Q_0	D_1	D_0
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. (10pts) Show the minterm form of D_1

3. (10pts) Show the reduced algebraic expression.

4. (10pts) Show the minterm form of D_0

5. (10pts) Show the reduced algebraic expression.

6. (10pts) Show the reduced circuit (include both the flip flops)

Question 4

How much time did you spend on this homework assignment?