**CpE 3150**

**Fall 2018 Project2**

**Due November 29 (Firm deadline)**

**This is a group project, to be worked on and completed in collaboration with the group to which you were assigned in class.**

One final report is due per group.

A number of groups, selected randomly, will be asked to demonstrate the compilation and execution of their code.

**Your task is to expand the functionality of the 8051 microprocessor using the Booth’s multiplication approach.**  You are expected to write and test an assembly program that mimics the add-and-shift multiplication algorithm, Booth’s algorithm, and extended Booth’s algorithm as discussed in class.

1. Input operands in hexadecimal format, variable lengths, ranging from 6 to 12 bits should be supported.
2. Operand lengths are even.
3. Multiplicand and multiplier are of the same length.
4. For each pair of input numbers, your program should generate the input operand values followed by:
   1. Their multiplication result (in hexadecimal),
   2. The number of clock pulses it took to calculate this result (for all three algorithms),
   3. The number of additions/subtractions it took to calculate this result (for all three algorithms).
5. Test data will be made available on November 13. Your report should show and justify that your program operates correctly for this test data.
6. Your final **technical report** should include:
   1. A description of your overall approach and the logic of your program,
   2. Pseudo code for your assembly program,
   3. A table that shows input operands (in hexadecimal), multiplication result (in hexadecimal), and number of clock pulses and number of additions/subtractions for each pair of input operands for each algorithm (from the test data),
   4. Three overlapping curves (use different colors) showing the number of additions/subtractions vs. the operand length, and
   5. A hard copy of your assembly program.
7. Please note that the **deadline is firm** and will not change under any circumstances.