C335 Homework #5

Points: : 40 points
Due Date: : Mar. 24th

Submissions: : For F-2-F students, hardcopy (type or write your solution clearly)

For online students, e-copy to Canvas

PART I (8 POINTS)

Assume that X consists of 3 bits, x2, x1, and x0. Write four logic functions that are true if and only if

- (A) X contains only one 0
- (B) X contains an even number of 0s
- (C) X when interpreted as an unsigned binary number is less than 4
- (D) X when interpreted as a signed (two's complement) number is negative

PART II (8 POINTS)

With x = 01011011 (bin) and y = 00001101(bin) representing two's complement signed integers, perform, showing all work:

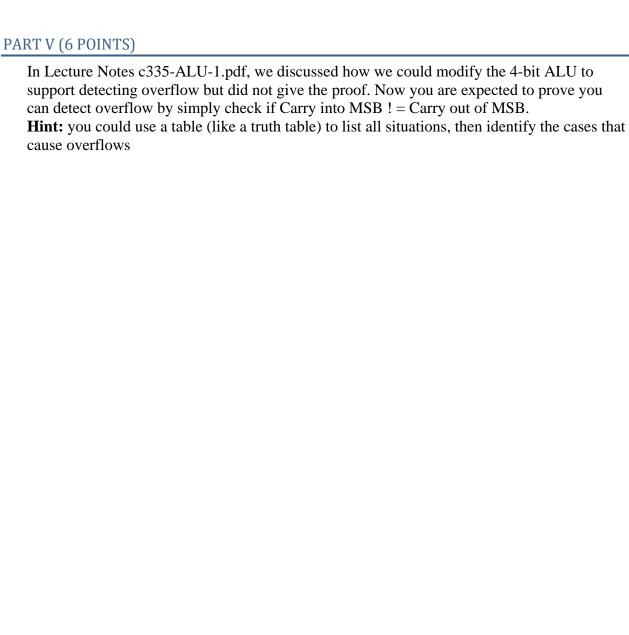
- (A) x + y
- (B) x y
- (C) x * y
- (D) x/y

PART III (6 POINTS)

Do the unsigned multiply for 0011 * 0111, using the <u>Multiply Algorithm Version 3</u> (check the lecture notes). Show the contents of registers for multiplicand (4 bits) and product (8 bits) step by step.

PART IV (6 POINTS)

Do the unsigned multiply for 0011 * 0111, using the <u>Booth's Algorithm</u> (check the lecture notes). Show the contents of registers for multiplicand (4 bits) and product (8 bits) step by step.



PART VI (6 POINTS)

Do necessary modifications on the following 1 bit ALU, then use it to construct a 4-bit ALU that supports the SLT instruction.

Hint: read text appendix **B** section **B.5** to find clue.

