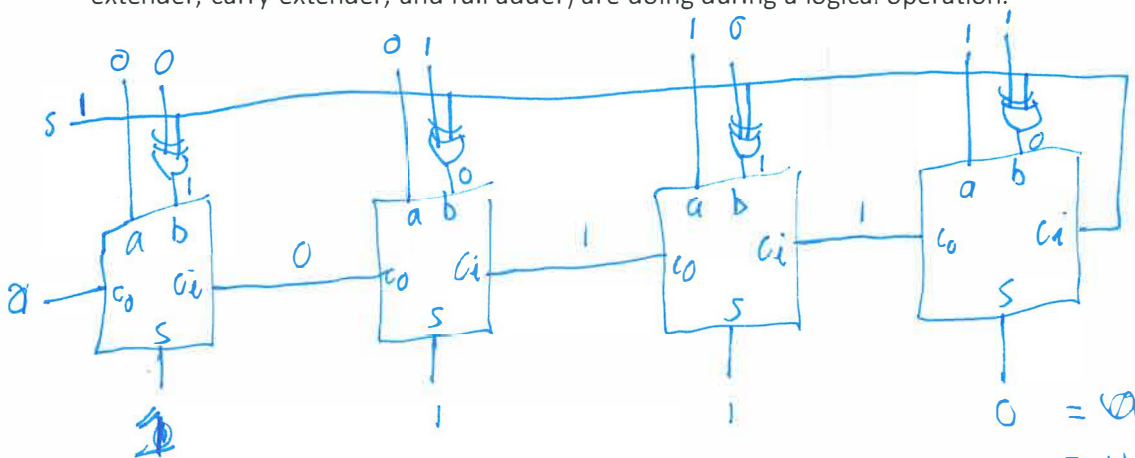
Name Answers

CE-1901-11 – Dr. Durant – Quiz 7
Winter 2016-'17, Week 8 Quiz

1. (6 points) Subtraction
   a. (4 points) ***Draw*** the block diagram for the 4-bit ripple-carry adder-subtractor (RCAS4). ***Use*** full adder (FA) blocks. ***Hint***: You need a "s"ubtract input and 4 XOR2 gates.
   b. (2 points) ***Label*** the inputs to your RCAS4 so that it is subtracting B=5 from A=3. ***Show the logic value*** of every node in the circuit (but not the internal details of the FAs). Comment on whether your answer is correct (3 – 5 = -2?).
2. (4 points) ALUs
   a. (2 points) Using 4-bit unsigned numbers, ***calculate*** the XNOR of the decimal numbers 10 and 6. ***Show*** your work.
   b. (2 points) ***Explain*** the purpose of the LE (logic extender) in calculating a logical function in the ALU designed in class. Be sure to ***include*** what the other key components (arithmetic extender, carry extender, and full adder) are doing during a logical operation.



= 1110 = -2

Yes, the result is correctly -2; no overflow

2 (a) A 10 1010
B ⊙6 ⊙0110
3 ← 0011

(b) When a logical operation is selected, the LE, with inputs a + b, calculates the result. The other extenders all output 0 so that the RCA adds 0 to the result, leaving it correct & unmodified

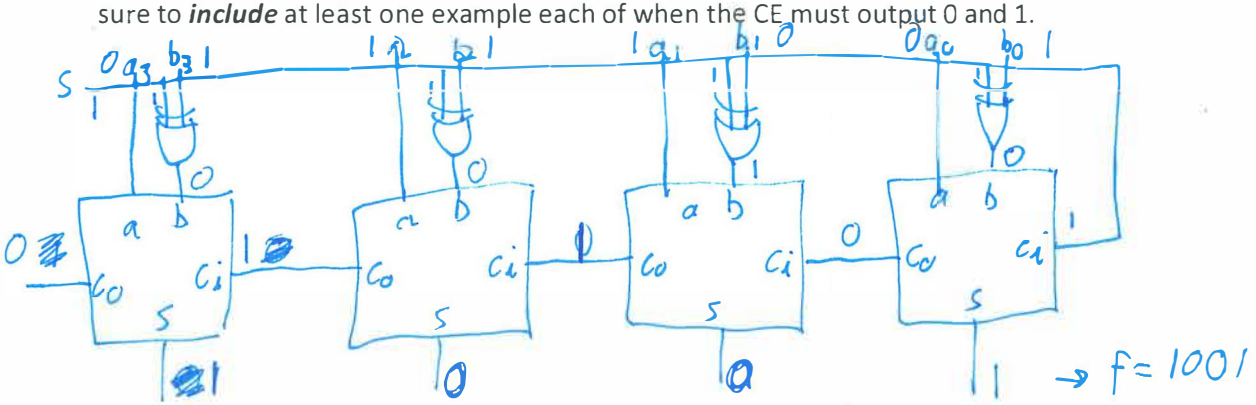
Name Answers

CE-1901-12 – Dr. Durant – Quiz 7
Winter 2016-'17, Week 8 Quiz

1. (6 points) Subtraction
   a. (4 points) ***Draw*** the block diagram for the 4-bit ripple-carry adder-subtractor (RCAS4). ***Use*** full adder (FA) blocks. ***Hint***: You need a "s"ubtract input and 4 XOR2 gates.
   b. (2 points) ***Label*** the inputs to your RCAS4 so that it is subtracting B=-3 from A=6. ***Show the logic value*** of every node in the circuit (but not the internal details of the FAs). ***Assume*** that you're using the same system for interpreting the output as for the inputs. Comment on whether your answer is correct (6 – -3 = 9?).

$-3 = 1101$

2. (4 points) ALUs
   a. (2 points) Using 4-bit unsigned numbers, ***calculate*** the XOR of the decimal numbers 5 and 12. ***Show*** your work.
   b. (2 points) ***Explain*** the purpose of the CE (carry extender) in the ALU designed in class. Be sure to ***include*** at least one example each of when the CE must output 0 and 1.



Signed system, so 1001 = −7 → signed overflow.
Error = −7 − 9 = −16 = −(2⁴)

(2) (a) 5 0101
+12 01100
9 ← 1001

(B) Generates C_0 for the specified operation, eg. 0 for A+B but 1 for A−B for 2's complement operation on B.