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Assignment 4 - Digital Logic
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Assignment 4

Chapter 4 Exercises

- 1)
  $0110_{10} + 0011_{10} = 1001_{10}$
  $6 + 3 = 9$

- 2)
  $1110 + 0111 = (1)0101$
  $-2 + 7 = 5$
  This addition does not result in an overflow because 1110 and 0111 do not share the same sign.

- 3)
  Partly. The result on an overflowing output bus is the negation of the correct answer. When overflow occurs, the processor should send the result in a bigger memory space and put the correct sign bit in the right place.

- 4)
  $0xBA + 0x7F = 0x(1)39$
  $10111010 + 01111111 = (1)00111001$
  $-70 + 127 = 57$
  This addition also does not result in an overflow because the signs are not the same on either operand.

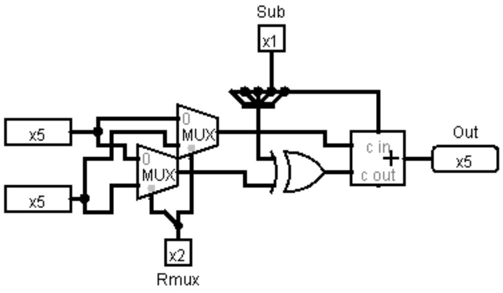
- 5)
  $1110 + 1001 = 10111$
  $-2 + -7 = -9$
  This addition does result in overflow. The sign bit gets pushed to the next largest bit (the 5th bit).

- 6)

A	B	Cin	Sum
x	y	Cin	if $-128 < x + y + Cin < 127$, $x + y$; else $(x + y + Cin) - 256$

- 7)
  If $Sa + Sb + Cout$ then $Ovfl$
  Other than that, Overflow may or may not happen with the given signals.

- 8)



- 10)
  The *Inv.* block is just one XOR gate.
  The *Neg.* block may consist of a NOT gate on each bit and minus one the number of bits of the signal one bit full adders. The one bit full adder I built consisted of 8 gates, so for an 8 bit signal, a *Neg.* block may consist of 8+8*7 = 64 gates. Ill take the *Inv.* block, thank you.

- 11)
  Because to fully negate signal B, it must add 1 to it, otherwise it would just be inverting it.

- 12)
  The borrow signal returns 1 when B is trying to subtract from a number greater than itself if B is negative.
  I actually don't know. I don't think this is right. I will ask this in class.