ECE428 HW4

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ECE428/528 Homework 4

1. Design a circuit to compute s=x+y. Note that x and y are 4-bit signed-magnitude numbers and s is 5-bit signed-magnitude numbers.

   Hints:

   a) Depending on the sign bits of x and y, the operation can be |x|+|y|, |x|-|y|, -|x|+|y|, or −(|x|+|y|), where |x| and |y| are the magnitude of x and y

   b) After the magnitude operation, the result is not signed-magnitude number. It needs to be converted into signed-magnitude number

   c) Your design can ignore overflow problem.

   d) You can assume value 0 is always represented by 0000, not by 1000, at the input.

$X[3:0], y[3:0]$ (signed magnitude)

$s[4:0]$, (signed magnitude)

SIMPLE APPROACH (DESIGN #1)
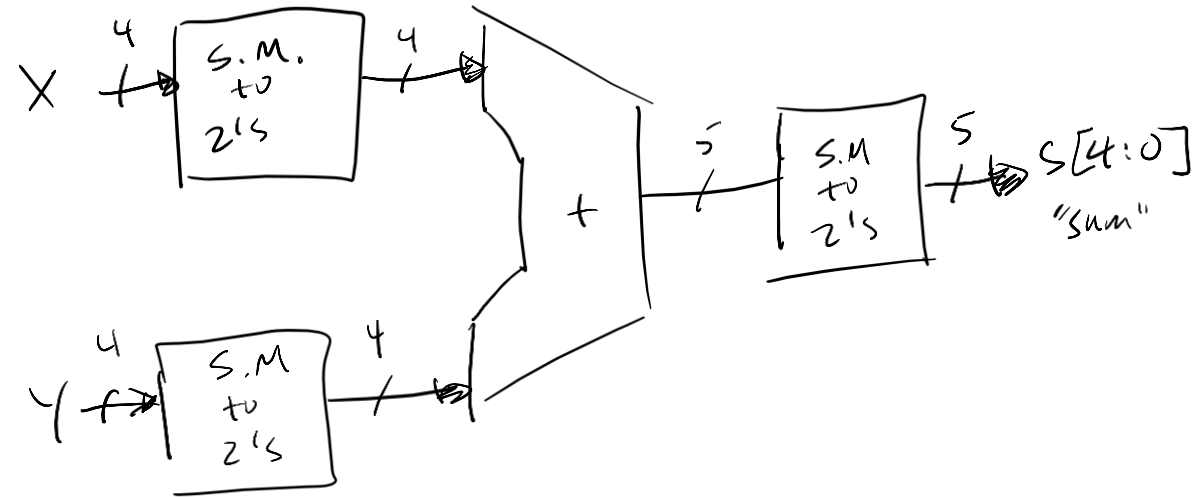
↑ THE FOLLOWING LEVERAGES THE 2's COMPLEMENT CONVERTER, BUT THERE ARE DRAWBACKS TO LOSING THE MAX NUMBERS WE CAN REPRESENT WITH 4-bit 2's COMPLEMENT NUMBERS AS COMPARED TO SIGNED MAGNITUDE NUMBERS.