

Homework 5

1. Represent each of the following decimal values in signed 2s-compliment format of 10 bits: 26, -37, 497 and -123.
2. Find the decimal values represented by the following signed 2s-complement notations of $n = 11$ bits:
 - 10110100101
 - 10010010101
3. Carry out the following operations in signed 2s-complement form of $n = 9$ bits:
 - $23 + 47$
 - $-23 + 47$
 - $23 - 47 = 23 + (-47)$
 - $-23 - 47 = -23 + (-47)$
4. Carry out the following subtractions in signed 2s-complement form of $n = 6$ bits:
 - $0.6875 - 0.40625$
 - $0.40625 - 0.6875$
5. As discussed in class, an overflow or underflow during addition can be detected by checking if the *CarryIn* and *CarryOut* of the MSB are the same. Prove that this check is valid in general in all six (why six?) possible combinations of the signs of the two operands A and B , as well as the result $A + B$, as listed below. All you need to do is to check for each case to confirm that the result will have the wrong sign if and only if C_{in} and C_{out} of the MSB are different.

Operand A	Operand B	Result A+B	C_{in}	C_{out}	right/wrong?
≥ 0	≥ 0	≥ 0			
≥ 0	≥ 0	< 0			
≥ 0	< 0	≥ 0			
≥ 0	< 0	< 0			
< 0	< 0	≥ 0			
< 0	< 0	< 0			

Hint: This is an easy proof as you simply exhaust all the possible cases.