

# INF2270, exercise in combinational logic and two's complement arithmetic

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## Abstract

In this exercise you will design a combinational circuit that may be useful for the mandatory exercise and briefly check if you understand how to interpret the two's complement representation.

## Task 1

To find the inverse of a two's complement binary number one needs to invert each single bit and add 1. Thus, a circuit that increments a two's complement number may be useful to complete an inversion. Try to design a circuit that increments a 9 bit two's complement number. Note that a full adder is an overkill. Your circuit should be simpler.

In order to test your circuit you may design it with the ISE design suite (see the mandatory exercise oblig1.pdf for an introduction to the tool). For your convenience, a skeleton setup for your design can be found under

`~inf2270/programmer/Increment`

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## Task 2

Please convert the following two's complement binary numbers to signed decimal:

11011	=	?
1110111	=	?
1010101	=	?
10000001	=	?
11111111	=	?

What is the corresponding 8 bit two's complement number for:

-31 = ?  
-32 = ?  
-127 = ?  
-128 = ?  
-77 = ?  
22 = ?