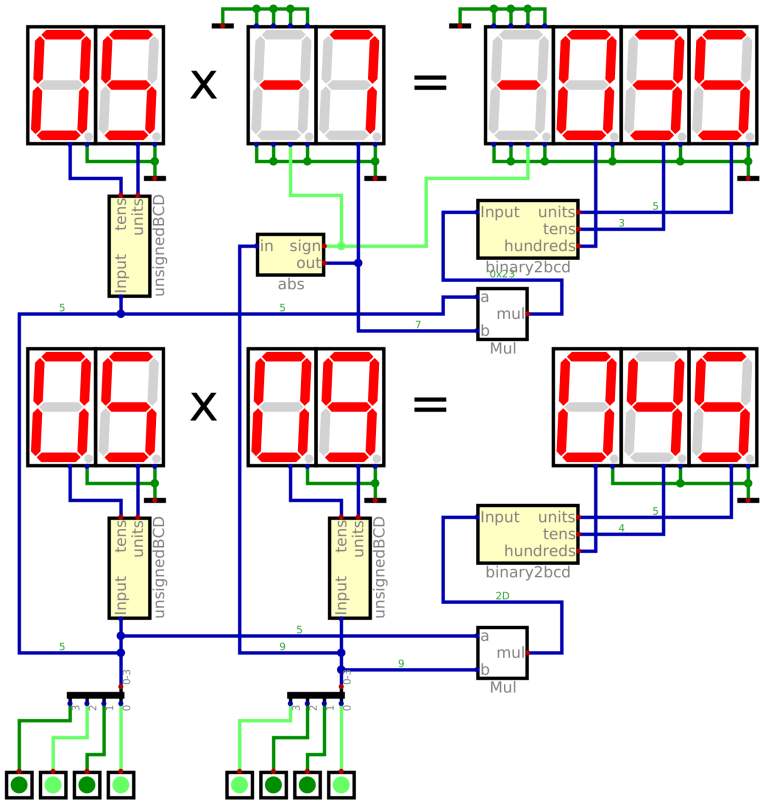
CS 303 Logic and Digital System Design
Laboratory Assignment #02

Assigned : 11/03/2025
Preliminary work due Sessions: 18/03/2025
Preliminary work due: 17/03/2025 23:59

While adders may accept the two's complement representation of a negative number and generate the correct result, this does not apply to multipliers: they will always treat their input as an unsigned number. For the multiplier to accept a negative number, we need to convert the number to its signed magnitude representation.

In this experiment, you will be provided with a template circuit in *Digital* which uses the built-in multiplier block to calculate the product of two numbers. While the lower row takes both numbers as unsigned, the circuit is expected to treat the 2nd argument of the upper row as a signed number. To do this, a block named *abs* is inserted into the signal path, which is expected to calculate the *absolute value* and the *sign* of its input. A sample run is show in the figure:



In your template, the absolute value and sign calculator circuit is not implemented: it copies the input to the output, and always produces a logic-0 at the sign output. As a preliminary work for your laboratory session, you are expected to design *abs.dig* using

1. Just one 3-bit adder, and
2. Appropriate number of XOR gates.

and upload your circuit to SUcourse. Modify *abs.dig* only, do not change any other part of the template.

During the laboratory session, you will be asked to make modifications and/or additions to the circuit, and submit your design by the end of the session.

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