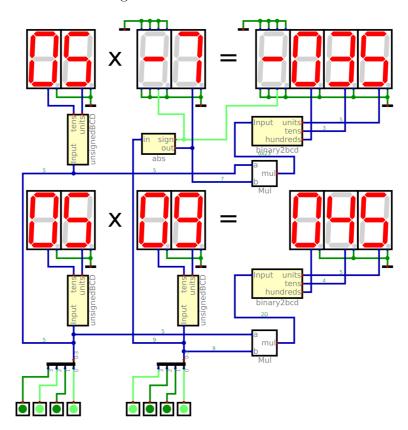
Assigned: 13/03/2023Preliminary work due: 20/03/2023

Sessions: 20/03-24/03

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 2^{nd} 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.diq 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.