Systems I
Lab 5
Multiplier

This assignment is due Thursday, Mar-12, 11:59 pm.

1 Building the multiplier

For this lab, you will construct *version 3* of the multiplier that we worked out in class. Create a new project in *CircuitVerse* and name it `lab-5-multiplier`. Consider how the circuit will be controlled. Specifically, you should use:

- 1 4-bit input the *multiplier* value.
- 1 4-bit input to set the *multiplicand* value.
- 1 button to control the *clock* (using the normal output).
- 1 1-bit input to control the *multiplexers* (to select between *initialization* and *computation* inputs).

You would then operate the multiplier by performing the following steps:

1. Set the multiplicand and multiplier on the inputs.
2. Set the multiplexer control for *initialization* and then press the *clock* button.
3. Set the multiplexer control for *computation* and then press the *clock* button **four times**, performing the four steps of computation.

Note that there are new devices that you will need:

- The *multiplexer*, available under *Decoders & Plexers*. This can be set to take in multi-bit values.
- The *adder*, available under *Misc*. It can be set to add 4-bit values, but you need to also use the `Cout` output to obtain a full 5-bit result.

2 Submitting your work

Once you have a detector working, demonstrate the working circuit by **taking a video** of it multiplying the following pairs of 4-bit numbers (with the **first** value as the multiplicand, and the **second** value as the multiplier):

1. `0000 x 0000`
2. `0000 x 0001`
3. `0001 x 0000`
4. `1111 x 0001`
5. `0010 x 0100`
6. `1011 x 1101`

Upload your video to your `lab-5` folder in your shared Google Drive folder for this class. Then, in CircuitVerse, add as collaborators…

- `sfkaplan@amherst.edu`, **and**…
- `endayishimiye28@amherst.edu` for Section 01, **or**…
- `ysantoslage28@amherst.edu` for Section 02.