**Lab #4 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **Item** | **Grade** | **Points** |
| **Milestone #1** | **5** |  |
| **Milestone #2** | **5** |  |
| **Required** | **30** |  |
| **B Func** | **10** |  |
| **A Func** | **10** |  |
| **Github** | **5** |  |
| **Code Style** | **10** |  |
| **Readme** | **25** |  |
| **Total** | **100** |  |

**Requirements**

1. At 440Hz, the LUT should be incremented by about 1 index.
2. Be able to make between a 0.1Hz and 0.25Hz change in frequency.

**Milestone #1**

The schematic must contain the following.

* A border defining the top-level entity. Borders for each of the components instantiated with-in the top-level entity.
* All components must be named in the upper left corner.
* All signals entering and exiting components must have their port name defined just inside the border.
* All signals outside the components must have their width defined as well as be labeled with their names.

You will need to be able to demonstrate how your design will meet the requirements above using calculations.

**Milestone #2**

Working testbench that generates a timing diagram with the following signals

* Clk reset ready
* FSM state BRAM address Phase increment
* BRAM data out Amplitude coefficient Multiplied data out
* Slide switches Button values

**Required Functionality**

In order to make required functionality you will need to use the slide switches and push buttons to manipulate the phase angle and the amplitude of the waveform.

* Pressing the left button should decrease the frequency of the waveform by the amount set on the slide switches.
* Pressing the right button should decrease the frequency of the waveform by the amount set on the slide switches.

The waveform should be played back through the AC97 interface.

**B-level functionality**

Achieve required functionality plus:

* Pressing the up button should increase the amplitude of the waveform by the amount set on the slide switches.
* Pressing the down button should increase the amplitude of the waveform by the amount set on the slide switches.
* Pressing the center button should toggle between 2-different waveforms.

**A-level functionality**

Use the microBlaze to manipulate the amplitude and frequency. The user will enter in a integer frequency and you are to produce a waveform at that frequency.