ECEN 2350: Digital Logic

Assignment #11

1. [15 points.] Make a millisecond-accurate timer that starts at `0.000`, counts up to `9.999` seconds, and then resets back to `0.000`.

   To do this, you should divide the 100 MHz clock signal to provide a 1 KHz clock (a clock with a period of 1 ms). This clock should be used to increment a 4-digit decimal counter. For instance, you can have each digit be represented as a 4-bit binary number, that resets to 0 when it gets to 10, and increments the next digit.

   You should display the count on the right-most four hex displays, as a decimal number. You may modify your solution from Lab 10 to control the hex displays.

   Here's a video showing the intended functionality:
   https://youtu.be/_IRhu1BZWfI

   Turn in your code as `lab11-q1.txt`.

2. [10 points.] Using your timer from Part 1, add functionality to your timer to let you reset and start/stop it:

   (a) When you press the `BTN0` button, your timer should reset back to 0.000.

   (b) When you press the `BTN1` button, your timer should start or stop. If the timer is currently stopped, pressing this button should start it. If it is currently running, pressing this button should stop it.

   Here's a video showing the intended functionality:
   https://youtu.be/IHqSq-_tnvM

   As a fun aside, see if you can get the timer to stop on an exact value, like `9.999` or `2.350`. Given the speed that digital circuits operate at compared to humans, this should be very difficult, and require quite a bit of luck!

   Turn in your code as `lab11-q2.txt`.