CME 341 Lab Exam 1 (BCD Decoder)

Preamble

- Create a folder and a project named `lab_exam_1`. Copy the following files from the 'Lab_exam_1' page (on the course website) to the `lab_exam_1` folder that you made:
  - `BCD_lab_Exam.sv`
  - `BCD_Exam.qxp`
  - `BCD_lab_exam.csv`
  - `BCD_lab_exam.sdc`

1. Add the downloaded **sv, qxp** and **sdc** files to the project. *Be sure to add the pin assignments to the project that are given in the csv file from the **assignments** menu in Quartus.*
2. Be sure to set all unused pins on the FPGA to be tri-stated input pins with weak pull-up resistors.
3. copy all the files necessary for your `sequential_B_to_BCD_converter` to work into the project directory and add them to the project (i.e. `sequential_B_to_BCD_converter.sv`, `counter.sv`, `basic_BCD_counter.sv`, `hex_display_driver.sv` and `BCD_counter.sv` if applicable).
4. Instantiate your `sequential_B_to_BCD_converter` by modifying the following code in the `BCD_lab_Exam.sv` file to match your `sequential_B_to_BCD_converter` port list (your signal names may be different if you didn't follow the lab manual exactly):

   sequential_B_to_BCD_converter sbcd1(.sw(value),
   .clk(CLOCK_27),
   .hex0(a0),
   .hex1(a1),
   .hex2(a2)
   );
5. Compile the project and program the board with it. You should be able to see HEX2..0 counting upward. You should also see HEX6 and HEX5 with a blinking "-". The BCD_exam.qxp module will run a test on your circuit and after a short time will display a number on HEX7.

   If your BCD circuit is working correctly you should see the number 3 appear on HEX7 indicating that the 3 digits are working correctly. If you do not see a 3 appear then there is likely something wrong in your circuit, please contact the Lab Instructor for assistance if you are unsure what is going wrong.

   To speed up the test set SW[0] = 1'b1 by using the switches on the FPGA.

- The exam will ask you to make some changes to your BCD circuits in order to verify you understanding of those circuits.
- The exam is open book, but no phones or wireless devices are to be used (i.e. no communication between people). You may access the class notes, lab manual, your personal notes (as long as they are printed or saved on the lab computers. You may not use cloud storage during the exam.)