**CMPEN 270: Digital Design: Theory and Practice**

**Module 15b Lab: Improved Pong**

**Due: 5/1/22**

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**Grading Rubric**

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| **Criteria** | **Grade** |
| Initial grade, based on how well the functional specification is met  Excellent (exceptional achievement) 90-100%  Good (extensive achievement) 80-89%  Satisfactory (acceptable achievement) 72-79%  Poor (minimal achievement) 65 to 71%  Failure (inadequate achievement) 0-64% | / 35 |
| Modification for design documents  Block diagrams  State diagrams  State tables  Other |  |
| Modification for coding style, comments, efficiency  Header comments for files  Other comments (informative but not excessive)  Proper code indenting, alignment, use of whitespace  Code is clean (doesn't have commented out code without a good reason)  Self documenting code (good signal and component names, clear structure, etc.)  General approach (algorithms)  Coding details (operations)  Proper use of components  VHDL matches design documents  Other |  |
| Modification for sections in this report  Design  Verification  Evaluation  Questions  Other |  |
| Bonus (optional challenge, etc.) |  |
| Penalties  No grade until all deliverables are submitted, late submission penalty for anything submitted late  Late submission: (<1 day) -10%, (<1 week) -30%, (<2 weeks) -50%, (>=2 weeks) -99%  Attachments missing, not in order, instructions not followed: -10%  Other |  |
| TOTAL (Max is 100% of total points unless specified otherwise in handout) | / 35 |

**ACKNOWLEDGEMENT**

This work is entirely my own and I did not provide any assistance except as noted.

100% Robert Myers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Robert Myers\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ATTACHMENTS**

The following are attached, in this order:

* There are no design documents to attach for this lab

Be sure to submit all files needed to recreate and test your design (all VHDL files, Tcl test files, and the XDC file). Also be sure to submit your demo video.

**DESIGN**

See attached design worksheet.

**VERIFICATION**

Testing this was different than other labs in that there were no “milestones” to verify your design was consistent until the top-level implementation. Fortunately, I only hit one minor snag. On the first synthesis and implementation, I found that my score was counting by 6. After reviewing my design, I had the inputs to one of the mux’s in the datapath file flipped. Switching this to the correct order, I was able to implement a design that met functional specifications.

**EVALUATION**

No performance metrics are required for this lab.

**QUESTIONS**

There are no questions for this lab.