

ECE 3544, Fall 2018, Project 4 Validation Sheet: Time-of-Day Clock and Countdown Timer Alarm (A Design Project)

GTA Validation Instructions:

Program the FPGA on the DE1-SoC board. In the following, unless it is explicitly stated to hold a key pressed down, “press a key” means to press and release the key.

1. Put the design in the reset state by pressing and holding down KEY0. Record the value of the rightmost four seven segment displays (HEX3:HEX0) as **four digits**: \_\_\_\_\_

Release KEY0 after recording the value.

2. Compare the four digits from step 2 to the last four digits of the student’s ID number on their ID card. *If the value does not match the last four digits of the student’s Student ID Number, stop the validation.*

For the remaining steps, you should have an external clock that shows seconds available (e.g., watch, cell phone, clock on the computer, or [time.gov/widget.html](http://time.gov/widget.html) on a browser). When you record values of the displays, any blank (totally off) digits should be indicated by a dash (-).

3. Press KEY0. Record the value of the seven segment displays immediately after leaving releasing KEY0 as **six hex digits**: \_\_\_\_\_

Note the time on your external clock.

4. Press KEY3 to switch to countdown alarm mode. Press KEY2 to start the countdown alarm, wait about 5 seconds according to your external clock, and press KEY2 again to stop the count. Record the value of the displays as **six hex digits**: \_\_\_\_\_.

Did HEX4 through HEX0 displays count down through the sequence 00100, 00059, 00058, 00057, 00056, 00055...? **Yes / No** (circle one) (The leading 0’s may be blank, so ignore them in answering the question.) If no, write down the sequence in the comments section at the end of the validation sheet.

5. Press KEY1 once. Record the value of the displays as **six hex digits**: \_\_\_\_\_.

6. Does HEX4 (next to leftmost display) flash? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

7. Press KEY3 once. Do HEX3 and HEX2 flash? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

8. Press KEY2 twice and then press KEY1. Record the value of the displays as **six hex digits**: \_\_\_\_\_.

9. Press KEY2. Does the countdown alarm begin counting down? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

10. Press KEY3 once. The seven segment displays should now show the time-of-day. Record the value of the displays as **six hex digits**: \_\_\_\_\_.

Compare the time elapsed since noting the time on your external clock after step 3 to the time elapsed on the time-of-day clock. Is the elapsed time what you would expect? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

In the following steps, you will be setting the time to 12:59:00 to verify that the clock properly turns over from 12:59:59 to 1:00:00. You should work quickly enough that the countdown alarm does not elapse and set off the alarm before you finish setting the time (3 minutes).

11. Watch the displays, wait until the seconds (rightmost two digits, HEX1:HEX0) reach 59. Do the seconds and minutes increment properly (seconds go from 59 to 00, and minutes increment by 1)? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

12. Press KEY1 once. Do the seconds (HEX1:HEX0) flash? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

13. Press KEY2 once. Do the seconds reset to 00? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

14. Press KEY3. Do the minutes (HEX3:HEX2) begin to flash? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

15. Press KEY2 several times. Do the minutes increment by 1 each time KEY2 is pressed? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet. Continue incrementing the minutes to 59.

15. Press KEY3. Do the hours (HEX6:HEX5) begin to flash (HEX6 should be blank if the hours are in the range of 1 to 9)? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

16. Press KEY2 several times. Do the hours increment by 1 each time KEY2 is pressed? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet. Continue incrementing the hours to 12. Press KEY1 to set the time to 12:59.

17. Allow the clock to run until 12:59:59. Does the clock roll over to 1:00:00? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

18. Wait until approximately 3 minutes after completing step 9 (starting the countdown timer). Does the countdown alarm begin to flash the display digits? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

19. Press KEY3 to return to countdown timer mode. Press any of KEY1, KEY2 or KEY3. Does the alarm turn off (displays quit flashing and show a time of 0:00)? **Yes / No** (circle one). If no, write down the behavior in the comments section at the end of the validation sheet.

Comments (For answers above that are "no", or if there is something else unusual or wrong):

GTA Printed Name and Signature: \_\_\_\_\_ Date/Time: \_\_\_\_\_