CSCI 2321 (Computer Design), Spring 2018

Homework 5

Credit: 20 points.

1 Reading

Be sure you have read, or at least skimmed, all assigned sections of Appendix B.

2 Honor Code Statement

Please include with each part of the assignment the Honor Code pledge or just the word "pledged", plus one or more of the following about collaboration and help (as many as apply).[1] Text *in italics* is explanatory or something for you to fill in. For written assignments, it should go right after your name and the assignment number; for programming assignments, it should go in comments at the start of your program(s).

- This assignment is entirely my own work. *(Here, "entirely my own work" means that it's your own work except for anything you got from the assignment itself — some programming assignments include "starter code", for example — or from the course Web site. In particular, for programming assignments you can copy freely from anything on the "sample programs page".)*
- I worked with *names of other students* on this assignment.
- I got help with this assignment from *source of help — ACM tutoring, another student in the course, the instructor, etc. (Here, "help" means significant help, beyond a little assistance with tools or compiler errors.)*
- I got help from *outside source — a book other than the textbook (give title and author), a Web site (give its URL), etc.. (Here too, you only need to mention significant help — you don't need to tell me that you looked up an error message on the Web, but if you found an algorithm or a code sketch, tell me about that.)*
- I provided help to *names of students* on this assignment. *(And here too, you only need to tell me about significant help.)*

3 Problems

Answer the following questions. You may write out your answers by hand or using a word processor or other program, but please submit hard copy, either in class or in one of my mailboxes (outside my office or in the ASO).

[1] Credit where credit is due: I based the wording of this list on a posting to a SIGCSE mailing list. SIGCSE is the ACM's Special Interest Group on CS Education.

1. (5 points) Do problem B.7 from the textbook. Note that the parity functions (odd or even) described in Appendix B (starting on p. B-65) are the same idea as "parity bits" as described in many online sources (the Wikipedia article, for example) *but not exactly the same* — a parity function tells you whether the input already has whatever parity it is, while a parity bit is whatever is needed to produce the desired parity.

2. (5 points) Do problem B.8 from the textbook. (Here, "bubbled inputs" means for you to show negated inputs with bubbles, as in Figure B.3.4, rather than with explicit inverters.)

3. (5 points) Do problem B.37 from the textbook. (So, you are to to produce something analogous to the diagram in Figure B.10.2. Notice however that in the example this diagram illustrates, changes between states happen based on two inputs, while in this problem changes between states happen every cycle, so you won't really be labeling your edges with names of input signals that control transitions.) *Hint:* You might need more than three states.

4. (5 points) Do problem B.38 from the textbook. (So, you are to produce something analogous to the Boolean expressions in the text following Figure B.10.2, except that you will need a separate expression for each bit of the output state, assuming you have more than two, which you almost certainly will.) *Hint:* You could do worse than starting by writing down a truth table, where the inputs are the bits of the current state, and the outputs are the bits of the next state and the three outputs that control the lights.