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CS 2LC3

Assignment #1. Due October 3 (Monday), 2022, 23:59 via Avenue. Do not hesitate to discuss with TA or instructor all the problems as soon as you discover them. This assignment is easy but labour consuming. Start early!

Total: 127 pts

Instructions: For all assignments, the students must submit their solution to Avenue → Assessments → Assignment #

Students can simply solve the exercises on a paper and use a smartphone app called [CamScanner](#) and convert their entire solution into a single PDF file and submit it to avenue. The maximum upload file size is 2Gb in avenue for each submission.

Please make sure that the final PDF file is readable.

Students, who wish to use Microsoft word and do not have Microsoft Word on their computer, are suggested to use google document editor ([Google Docs](#)). This online software allows you to convert your final file into PDF file.

There will be a mark deduction for not following the submission instruction.

Please first finish the assignment on your local computer and at the end, and attach your solution as a PDF file.

You will have unlimited number of submissions until the deadline.

Students must submit their assignments to [Avenue](#). Any problem with Avenue, please discuss with Mahdee Jodayree <mahdijaf@yahoo.com>, the lead TA for this course.

Questions.

- 1.[2] Exercise 1.2(f) (page 21 of the Gries-Schneider textbook).
- 2.[2] Exercise 1.4 (page 21 of the Gries-Schneider textbook).
- 3.[2] Exercise 1.7(e) (page 21 of the Gries-Schneider textbook).
- 4.[2] Exercise 1.9(a) (page 22 of the Gries-Schneider textbook).
- 5.[2] Exercise 1.11(e) (page 22 of the Gries-Schneider textbook).
- 6.[6] Exercise 2.1 (page 38 of the Gries-Schneider textbook), questions (k), (l) and (m).

- 7.[4] Exercise 2.2 (page 38 of the Gries-Schneider textbook), questions (g) and (h).
- 8.[4] Exercise 2.3 (page 38 of the Gries-Schneider textbook), questions (f) and (g).
- 9.[4] Exercise 2.5 (page 39 of the Gries-Schneider textbook), questions (d) and (e).
- 10.[6] Exercise 2.7 (page 39 of the Gries-Schneider textbook), questions (h), (i) and (j).
- 11.[10] Exercise 2.9 (pages 39-40 of the Gries-Schneider textbook).
- 12.[6] Exercise 2.10 (page 40 of the Gries-Schneider textbook).
- 13.[3] Show that in a Boolean algebra, every element x has a *unique* complement $\neg x$ such that $x \vee \neg x = \text{true}$ and $x \wedge \neg x = \text{false}$.
- 14.[6] Any Boolean expression can be interpreted as a *Boolean function*. For example:
 $x \vee (\neg y \wedge z)$ is a Boolean function $f: \mathcal{B} \times \mathcal{B} \times \mathcal{B} \rightarrow \mathcal{B}$, $f(x, y, z) = x \vee (\neg y \wedge z)$.
- How many different Boolean functions $f(x, y, z)$ are there so $f(\neg x, \neg y, \neg z) = f(x, y, z)$ for all values of the Boolean variables x, y, z ?
- 15.[3] Exercise 3.4 (page 62 of the Gries-Schneider textbook)
- 16.[3] Exercise 3.6 (page 62 of the Gries-Schneider textbook)
- 17.[3] Exercise 3.12 (page 62 of the Gries-Schneider textbook)
- 18.[3] Exercise 3.13 (page 62 of the Gries-Schneider textbook)
- 19.[3] Exercise 3.17 (page 63 of the Gries-Schneider textbook)
- 20.[3] Exercise 3.18 (page 63 of the Gries-Schneider textbook)
- 21.[3] Exercise 3.22 (page 63 of the Gries-Schneider textbook)
- 22.[3] Exercise 3.24 (page 63 of the Gries-Schneider textbook)
- 23.[3] Exercise 3.32 (page 64 of the Gries-Schneider textbook)
- 24.[3] Exercise 3.34 (page 64 of the Gries-Schneider textbook)
- 25.[3] Exercise 3.43 (page 64 of the Gries-Schneider textbook)

- 26.[3] Exercise 3.45 (page 64 of the Gries-Schneider textbook)
- 27.[3] Exercise 3.48 (page 65 of the Gries-Schneider textbook)
- 28.[3] Exercise 3.51 (page 65 of the Gries-Schneider textbook)
- 29.[3] Exercise 3.76 (page 66 of the Gries-Schneider textbook)
- 30.[3] Exercise 3.78 (page 66 of the Gries-Schneider textbook)
- 31.[10] Exercise 5.5 (page 105 of the Gries-Schneider textbook)
- 32.[10] Exercise 5.6 (page 105 of the Gries-Schneider textbook), questions (b) and (c)

It appears some, actually quite few, students already did all sub questions of Q32 and they want some bonus for this, which is a reasonable demand, as this is a non trivial question. Hence I will add 20 bonus points for doing the whole Q32. So, those who consider this stuff easy, please do the entire Q32 so you will get bonus points.