

1. (25 pts) Heart-Rate Monitor

A heart rate monitor measures an individual's heart rate and blood pressure. Both sensors output zero (0) if they are within safety range. An alarm will sound if either sensor indicates an unsafe condition is present.

Set-up the appropriate truth table, **simplify (minimally)** using K-maps. **Implement**, using *LogiSim*, the simplified logic circuit with **optimal** number of logic gates.

2. (25 pts) RGB (LED's)

Three light-emitting diodes (LEDs) [one **R**ed, one **G**reen, one **B**lue] turn on when a number 0–7 is passed through. Red turns on with even numbers, green turns on with odd numbers, blue turns on with multiples of 3. Zero means they are all off, seven means they are all on.

Set-up the appropriate truth table, **simplify (minimally)** using K-maps. **Implement**, using *LogiSim*, the simplified logic circuit with **optimal** number of logic gates.

3. (25 pts) Student Grading

A teacher is grading the students in 4 subjects (**M**ath, **S**pelling, **E**nglish, and **H**istory) to see whether or not they will graduate. If a student passes Math and Spelling, they will graduate. If a student passes either English or History, they will graduate. All other students will not graduate.

Set-up the appropriate truth table, **simplify (minimally)** using K-maps. **Implement**, using *LogiSim*, the simplified logic circuit with **optimal** number of logic gates.

4. (25 pts) LookUp Table (LUT) design

Design a digital logic circuit (LookUp Table or LUT) with three inputs, **x**, **y** and **z**, and the three outputs, A, B, and C. When the binary input is 0, 1, 2, or 3, the binary output is 2 greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is 2 less than the input.

Set-up the appropriate truth table, **simplify (minimally)** using K-maps. **Implement**, using *LogiSim*, the simplified logic circuit with **optimal** number of logic gates.

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IMPORTANT NOTICE; We allow absolutely no copying and pasting of homework solutions from other students, internet sites or “student discord servers”. In all cases an automatic zero will be given for the specific homework.

- How can I submit my assignment?

The homework-report should **ALL** be written ... using only a word processor (Microsoft WORD, ..., or T_EX/L^AT_EX). **Absolutely no handwriting/handgraphing and photographing.** Writing the report follow the sample homework given in CANVAS (Modules).

... Upload the report in PDF to CANVAS

- Late submission policy:

LATE WORK (homework) POLICY. You lose 50% each day an assignment is late and after 2 days, it will not be accepted.

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- Note: The *LogiSim* circuits should be active and working.

LogiSim Tutorials:

... https://www.youtube.com/watch?v=cMz7wyY_PxE

... <https://www.youtube.com/watch?v=WExVhr583vA>

... <https://www.youtube.com/watch?v=ATPqpFMlVdw>