

Class Exercise 1A

Rules

- If you believe that you know a correct answer, please raise your hand
- I will select *one or more* students (independently whether an answer given by the first student is correct or incorrect)
- Please, identify yourself by first name and give an answer
- **Correct answer = 1 bonus point**

Problem 1

List all 2-input logic gates that you can recall.

Problem 2

How many 2-input logic functions can be theoretically defined (whether they make sense or not)?

Problem 3

List all 1-input logic gates.

Problem 4

What is a minimum set of gates that can be used to implement all logic functions?

Problem 5

List four ways of expressing logic functions.

Problem 6

What are the De Morgan's Laws?
Write their equations and draw their schematic representation.

Problem 7

How many select inputs does an 8-to-1 MUX have?

How many select inputs does an n-to-1 MUX have?

Problem 7

How many outputs does a decoder with two data inputs have?

How many outputs does a decoder with n data inputs have?

Problem 8

Show how to implement a decoder that recognizes the following 4 ranges of a 16-bit address A, and generates the corresponding enable signals `e0,e1,e2,e3`:

For A in:	Assert
`C000-CFFF:`	`e0`
`D000-DFFF:`	`e1`
`E000-EFFF:`	`e2`
`F000-FFFF:`	`e3`

Problem 9

How many inputs does an encoder with two data outputs have?

How many inputs does an encoder with n data outputs have?

Problem 10

What is a difference between encoder and priority encoder?

Problem 11

Show how to implement Priority Encoder using multiplexers and a minimum number of logic gates

Problem 12

What is a difference between an adder, half-adder, and full-adder?

Problem 13

Show how to implement Full Adder using 8-to-1 multiplexers only

Problem 14

Show how to implement Full Adder using
4-to-1 multiplexers and inverters only