

Exercise 12: Constructing Simple Threshold Networks

Summer Term 2024

After this exercise, you should be able to construct simple threshold networks.

Review: Please, review the concept of threshold neurons.

1. What is a connection and what the connection weight w_{ij} ?
2. What is the netinput net_i ?
3. What does the threshold value Θ_i do?
4. How is the threshold unit's transfer function defined?
5. What is the complete definition of a threshold unit?

To Do: For every task, you should summarize the network's logical function in a tabular form, and should then construct a network with a minimal number of threshold units. These exercises require a few think-and-act cycles 😊.

Tasks: Please consider the following problems:

1. Logical `and` with three inputs.
2. Logical `or` with four inputs.
3. Simple negation with one input and one output.
4. Logical `nand` with three inputs.
5. An `exclusive-or` function, i.e., (a) or (b) but *not* both, with two inputs and one output.
6. Realize the following two functions:

x_1	x_2	x_3	y
0	0	0	0
0	1	0	1
1	0	0	1
1	1	0	1
0	0	1	0
0	1	1	0
1	0	1	0
1	1	1	0

x_1	x_2	x_3	y
0	0	0	1
0	0	1	0
1	0	0	1
1	0	1	1
0	1	0	0
0	1	1	0
1	1	0	1
1	1	1	1

Have fun, Theo and Ralf.