Homework 3

- Submit one ZIP file per homework sheet which contains one PDF file (including pictures, computations, formulas, explanations, etc.) and other files if needed.

### Problem 3.1 *Wave Algorithms*   (2 points)

Recall the definition of wave algorithms (slide 11, lecture 10). Argue that there are issues in case of message duplication.

Propose a modification of the Echo Algorithm which can operate properly even if message duplication occurs.

Problem 3.2 *Echo Algorithm Execution*   (2 points)

Execute the Echo Algorithm on the network (graph) below, keeping track of each state, and updating the receive count on each node.
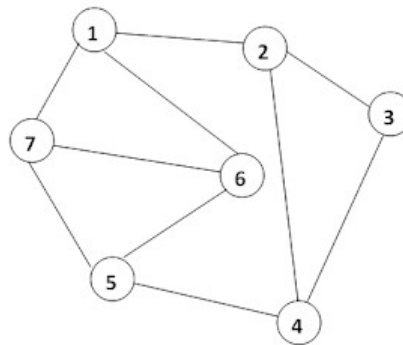
Problem 3.3 *Echo Algorithm Implementation*   (4 points)

Write a C or C++ or Python program that simulates the behavior of the Echo Algorithm. Test your program with the graph from lecture 12 and then with the graph from **Problem 3.2**, and by printing intermediate steps, check if your solution for **Problem 3.2** is correct.

You can use the following code as a starting point, but you can also do everything from scratch: `https://pastebin.com/K6Ew2vyd`.

Problem 3.4 *Hypercubes*   (2 points)

a) Approximate a bound on: in how many ways one can traverse the edges of an N-dimensional hypercube? A brief argumentation suffices.

b) What can be used to make the choice of path deterministic?

c*) Refer to literature to propose an optimized hypercube traversal. A link to a paper/article describing an optimzed traversal suffices.

How to submit your solutions

You can submit your solutions via *Grader* at **https://grader.eecs.jacobs-university.de** as one generated ZIP file containing one PDF file and other files if needed.

If there are problems with *Grader* (but only then), you can submit the file by sending mail to k.lipskoch@jacobs-university.de **with a subject line that starts with CA-CS-803**.

Please note, that after the deadline it will not be possible to submit solutions. It is useless to send solutions by mail, because they will not be graded.

This homework is due by Wednesdays, March 24th, 23:00.