

# MATH 441 HW4

Due Nov 12, **Tuesday**, in class or by email in a single PDF file < 1MB.  
You should send it before class, or points will be deducted!

The questions below are related to the presentations we had during the last three weeks. If you missed some of the presentations you can do your own research regarding the problem or you can ask one of the team members working on the selected project. For each problem list the answers as A, B, C, and D. (There should be 40 short answers all together)

For each problem below:

- A. State the NP complete problem the team is working on.
- B. What is the polynomial time reduction showing that the problem is NP complete? (Name the other NP complete problem which was used (or could be used) for the reduction)
- C. Is there an NP hard (and not NP-complete) version of the problem?
- D. What is the co-NP version of the problem?

The projects are

- 1 Knapsack
- 2 Longest Path
- 3 Battleships
- 4 Sudoku
- 5 Hamiltonian path
- 6 Graph colouring
- 7 Assembling Bitcoin
- 8 Traveling salesman
- 9 Hashiwokakero
- 10 Independent set