DIRECTED WORK SERIES NO. 1

Module: Algorithmic and data structures 1   College year: 2023/2024

Exercise 1

Two farmers fill a **24-liter** milk container can each time after milking their cows, however they have just two cans of **15 liters** and **9 liters** of respective capacities.

Q1) Can you help them by giving them the solution **to divide this milk into 2 equal parts** (Analysis)?

Let **A**, **B**, **C** be the containers with respective capacities of **24**, **15**, **9** liters and let the following actions (instructions) take place: **B ← A** *if we transverse A into B while filling B or until A becomes empty.*

Q2) Construct the algorithm corresponding to your analysis using the previous formalism?

Exercise 2

The **Marienbad** game is played by two people with 17 matches . Each player can take 1, 2, or 3 matches each time. The winner is the one who takes the last match.

Q) Build the analysis in order to win for sure, then the corresponding algorithm?

Exercise 3

We have 10 piles of 10 coins that look similar but we know that one pile is made up entirely of fake coins. Knowing that a good coin weighs 5 grams and that a false coin weighs 6 grams, give the analysis which allows us to find the pile of false coins in a single weighing and then write the corresponding algorithm.

Exercise 4 *(additional)*

You have 12 seemingly identical coins but you are sure that one of them is wrong because it does not have the same weight as all the others. How will you do, using a double-pan balance and in 3 weightings maximum, to find the wrong part and know if it is heavier or lighter? Construct the analysis of this problem.