Algorithms & Data Structures, Class № 1

Mathematical induction

Problem 1

Prove using mathematical induction that for all $n \geq 1$,

$$1 + 4 + 7 + \ldots + (3n - 2) = \frac{n(3n - 1)}{2}$$

Problem 2

Use the Principle of Mathematical Induction to verify that, for n any positive integer, $6^n - 1$ is divisible by 5.

Problem 3

Study the “Horse paradox” (we discussed it with cats during the class) and understand what mistake is done in the proof (`https://en.wikipedia.org/wiki/All_horses_are_the_same_color`).

Problem 4

Show using mathematical induction that $n! > 3^n$ for $n \geq 7$.