Mathematical Foundations of Computer Science
Constructor University
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Module: CH-233 Date: 2024-09-20 Due: 2024-09-27

## Problem Sheet #3

Problem 3.1: proof by contrapositive	(4 points)
Let $x, y \in \mathbb{R}$ be real numbers. If $y^3 + yx^2 \le x^3 + xy^2$ , then $y \le x$ .	
Problem 3.2: proof by contradiction	(2 points)
The equation $2x^2 + 2x - 1 = 2y^2$ has no solution for integer numbers $x, y \in \mathbb{Z}$ .	
Problem 3.3: proof by induction	(4 points)

Let  $n\in\mathbb{N}$  be a natural number with  $n\geq 1.$  Prove that the following holds:

$$1^{2} + 3^{2} + 5^{2} + \dots (2n-1)^{2} = \sum_{k=1}^{n} (2k-1)^{2} = \frac{2n(2n-1)(2n+1)}{6}$$