

Homework 1

**Theorem 0.1** (Pythagoras). *For a right triangle with sides  $a, b$  and hypotenuse  $c$ ,*

$$a^2 + b^2 = c^2. \tag{1}$$

*Proof.* We compute:

$$\begin{aligned} (a + b)^2 &= a^2 + 2ab + b^2, \\ (a - b)^2 &= a^2 - 2ab + b^2. \end{aligned}$$

Subtracting and rearranging gives the desired result. □

**Lemma 0.2.** *For  $n \in \mathbb{N}$ ,*

$$\sum_{k=1}^n k = \frac{n(n+1)}{2}.$$

*Remark.* You can replace the word “Theorem” with “Lemma”, “Proposition”, “Definition”, etc.