MATH 102: IDEAS OF MATH

WORKSHEET 7

Question 1. What is the general structure of induction? Contemplate why each step is crucial.

Date: October 2, 2024.

Question 2. Prove by induction that

$$1 + 2 + \cdots + n = \frac{n(n+1)}{2}\,.$$

Question 3. Let S_n be the sum of the first n natural numbers. Show by induction that for any $n \in \mathbb{N}$,

$$S_n + S_{n+1} = (n+1)^2\,.$$

Question 4. Show by induction that

$$1^2 + 2^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}\,.$$